
Larry Bond's
HARPOON 3
ADVANCED NAVAL WARFARE™
GAME MANUAL
matrix games
Advanced Gaming Systems

EPILEPSY WARNING

PLEASE READ THIS NOTICE BEFORE PLAYING THIS GAME OR BEFORE ALLOWING YOUR CHILDREN TO PLAY.

Certain individuals may experience epileptic seizures or loss of consciousness when subjected to strong, flashing lights for long periods of time. Such individuals may therefore experience a seizure while operating computer or video games. This can also affect individuals who have no prior medical record of epilepsy or have never previously experienced a seizure.

If you or any family member has ever experienced epilepsy symptoms (seizures or loss of consciousness) after exposure to flashing lights, please consult your doctor before playing this game.

Parental guidance is always suggested when children are using a computer and video games. Should you or your child experience dizziness, poor eyesight, eye or muscle twitching, loss of consciousness, feelings of disorientation or any type of involuntary movements or cramps while playing this game, turn it off immediately and consult your doctor before playing again.

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- Do not sit too close to the monitor. Sit as far as comfortably possible.
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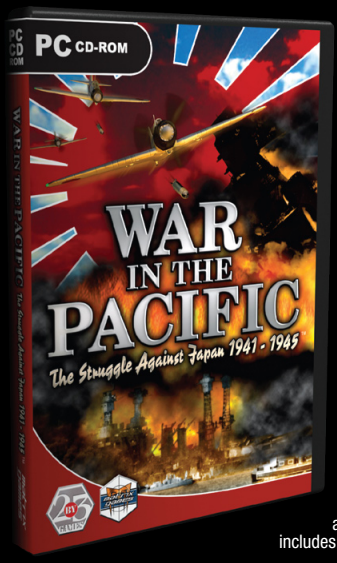
- Do not play when tired or short on sleep.
- Take care that there is sufficient lighting in the room.
- Be sure to take a break of 10-15 minutes every hour.

TOTAL WAR FOR TOTAL VICTORY!



The War At Sea - Besides critical hit locations for all weapons platforms and any radar installations, individual armor locations and a wealth of performance and characteristics data, each ship's crew has an experience rating for day and night combat. Every ship from mighty carriers and battleships down to gun boats has a commander with his own strengths and weaknesses. The game includes thousands of ships chosen from over 300 ship classes.

The War in the Air - A wide variety of aircraft are included in the game, ranging from the awkward P-39 and the nimble Zero, to the heavy hitting B-29 and the extremely fast and powerful Corsair. Pilots and crews are tracked separately from aircraft and have individual skill and fatigue ratings. When pilots are in short supply, they can be placed into the pilot pool and reassigned to other groups

The War on the Ground - Troops are needed to maintain and garrison bases and to deprive the enemy of his bases. So, troops are handled with care. There are a goodly number of different types of land-based units. The unit counters are mostly on division and brigade level, but there are many independent regiments and battalions. These are all represented by different unit counters and have different capabilities and include engineers, combat squads, Marine squads, support squads, air support sections,
Sherman tanks, Stuart tanks, motorized forces, a number of mortars and field artillery and many others.

There are 15 campaigns included with the game, which can be played against the computer opponent, hot seat, by secure email. War in the Pacific now gives you the chance to fight the entire war your way on every level.

Political Points – Some troops are restricted in deployment. Australian troops must be release from home defense, for instance, before they can be shipped off to fight in New Guinea. And, Admirals can't be everywhere, at once. Each day, each player accumulates political points which can be used to reassign assets to the various headquarters or to change leaders.

Japanese Production – Groups cannot fly without planes, ships need to be built and tanks have to come from somewhere. The Japanese player will never have enough industry to build all he needs. He can choose to increase the size of factories or change what they are building at the cost of retooling. He can also speed up or retard the building of specific ships to the possible detriment of the shipbuilding schedule. He will need oil and resources to make industry run and will want to capture locations with such materials as quickly as possible. Much of this gathering can be automated, but the player will be able to fine tune the procedure or manually order the loading and destination of his ships.

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NOTES:

1.0 Harpoon 3

He who commands the sea has command of everything.
- Themistocles, 514-449 B.C.

Thank you for purchasing *Harpoon 3 Advanced Naval Warfare™*.

1.1 Installation

Please ensure your system meets the minimum requirements listed below. To install the game, insert the Harpoon 3 CD into your CD-ROM drive. If you have disabled the Autorun function on your CD-ROM or if you are installing from a digital download, double-click on the installation archive file, then double click on the file that is shown inside the archive. Follow all on-screen prompts to complete installation.

Minimum System Requirements

Windows 98/XP/2000
(Requires PC emulator software to run on a Macintosh)*
800 MHz CPU (1 GHz recommended)
512MB RAM (1GB recommended)
80MB Hard Disk Space
DirectX 9.0 or better
16–bit DirectX compatible Soundcard
Updated video drivers for your graphics card
Windows compatible Mouse

* For Macintosh users, please refer to the following URL for Macintosh-specific configuration and setup options:

http://mediawiki.advancedgaming.biz/index.php/H3ANW_Macintosh

Uninstalling the Game

Please use the Add/Remove Programs option from the Windows Control Panel to uninstall the game.

1.2 Product Updates

In order to maintain our product excellence, Matrix Games releases updates containing new features, enhancements, and corrections to any known issues. Keeping up with these updates is made easy and is free by signing up for a Matrix Games Member account. When you're signed up, you can then register your Matrix Games products in order to receive access to these important game-related materials. Doing so is a simple two step process:

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Remember, once you have signed up for a Matrix Games Member account, you do not have to sign up again – at that point you are free to register for any Matrix Games product you purchase. Thank you and enjoy your game!

1.3 Game Forums

Our forums are one of the best things about Matrix Games. Every game has its own forum with our designers, developers and the gamers playing the game. If you are experiencing a problem, have a question or just an idea on how to make the game better, post a message there. Go to http://www.matrixgames.com and click on the Forums hyperlink.

1.4 Technical Support

Should you have a technical problem with the game, the best way to get help is to post a note in the Technical Support sub-forum within the *Harpoon 3™* forum at http://www.matrixgames.com. You'll then hear back from either Matrix or *Harpoon 3™* personnel, or from one of the many helpful players of the game. This is usually the fastest way to get help. Alternatively, you can email your problem to support@matrixgames.com.

2.0 Introduction

It follows then as certain as night succeeds day, that without a decisive naval force we can do nothing definitive, and that with it everything honorable and glorious.
-George Washington

Welcome Aboard!

You are about to take command of the awesome power of modern naval and air forces. If you are new to the Harpoon series, there is much to learn to successfully command these forces under the most difficult scenarios. If you are a seasoned "Harpooner," however, we believe we have put together an experience that, like the first *Harpoon* computer game, will provide you with thousands of hours of entertainment and challenging modern conflict. *Harpoon 3™* has plenty of things the veteran Harpoon user will find familiar, and yet there are many new features that will demand both your attention and newly acquired familiarity.

Harpoon 3™ is more than just a game; it is a simulation that accurately represents the capabilities and limitations of modern naval and air forces. A painstakingly detailed labor of love went into providing *Harpoon 3™* with the most accurate data that can be obtained from open or unclassified sources. You

will not find another entertainment product on the market that has the amount of data contained in the *Harpoon 3™* database.

The dedicated efforts of many people went into making this product the most accurate and exciting simulation you can run without security clearance. *Harpoon 3™* is not difficult to play, but it is a challenge to play well. While we want you to start enjoying the experience right away, we heartily recommend taking some time to become familiar with this manual before you set sail for the new challenges that await you. You will be a more proficient commander if you log a few hours doing the head work necessary to be the cool, confident, modern commander required to meet the contingencies and conflicts found in *Harpoon 3™*. As mentioned above, with the vast amount of information that you will receive as you command your forces, it is not uncommon to become overwhelmed. The greater your familiarity with the interface, and the custom features it offers, the better prepared you will be to lead your forces to the successful completion of the mission objectives.

In order to ensure your smooth transition from land to sea command, we will present to you a list of terminology first in order to get you acquainted with the language of this manual but also in-game information. After this, information regarding the interface, including hot keys and menu commands, will be covered. Once you have these basics reviewed, the Tutorial section will follow so you can jump right in and try your hand – after all, one learns best by doing.

Following these sections will be the detailed information regarding every aspect of the *Harpoon 3™* game. Once you've tried the Tutorial a time or two, reading this information will help you become more familiar with the specific aspects of commanding a ship or fleet in modern sea combat.

Congratulations, Commander, and good luck to you – the waterways of the world are a dangerous place, so you're going to need it.

2.1 Harpoon 3™ 101

Listen up, folks, as we don't have a lot of time to train you before you take command. If we're going to hand over to you the keys of a multi-billion-dollar platform, we're going to be absolutely sure you know the basics first.

Alphabet Soup

There are a lot of acronyms in the military – just about every system there is has one. While easy for 'insiders' to remember such things, anyone who hasn't heard of them will be at a loss. It is important to be very familiar with these terms in order to assure that you can make quick decisions, especially in the heat of battle. The following glossary will help you get familiar with the terms you need to know to command effectively.

NOTE THAT ACRONYMS OR TERMS IN BOLD WITHIN A DEFINITION HAVE THEIR OWN ENTRY ON THIS LISTM FOR MORE INFORMATIONL REFER TO THAT ENTRYM

- A -

AAA – Anti-Aircraft Artillery; refers to anything that has a capability to engage and destroy aircraft, including helicopters. Generally these are small-caliber, high-rate-of-fire weapons intended to shoot down aircraft and missiles. Human-operated weapons of this type are now obsolete, thanks to the speeds of aircraft and missiles, but automated systems like (see CIWS/Close In Weapon System, below) have proven useful.

AAM – Air-to-Air Missile; refers to a missile that is designed to be carried by an airplane and used to shoot down another airplane - the primary weapon of fighters.

AAW – Anti-Air Warfare; refers collectively to all aspects of fighting (including detecting and destroying) airborne targets.

AGM – Air-to-Ground Missile; refers to a missile designed to be carried by an aircraft and used to attack land targets.

Active – In naval warfare, this any device that transmits a signal. The term is generally applied to sensors, though communications devices are generally active as well.

Actual Course – The direction a vessel is actually traveling; thanks to the tactic of Zigzagging, this direction may be different from the Base Course.

AEW – Airborne Early Warning; refers to both the tactic of putting planes with powerful radars aloft over a group of vessels and the aircraft that are designed for that mission. The purpose of an AEW platform is to provide a long-range warning of potential threats, both airborne and seaborne. Typically, this mission is performed by the E2-C Hawkeye.

Air Defense Envelope – The area around a base or ship into which it can deliver anti-air weapons, generally missiles - in other words, the area around a base or ship in which enemy aircraft are vulnerable.

Anechoic Coating – A composite material made of rubber and other sound-deadening materials that is applied to submarine hulls and other surfaces (e.g. interior decking) to lessen the effectiveness of sonar detection.

Annulus – The donut-shaped area that a Convergence Zone can search.

ASM – Air-to-Surface Missile; refers to a missile designed to be carried by an aircraft and used to attack a vessel (e.g. a ship).

ASROC – Anti-Submarine Rocket; this is a torpedo loaded on the tip of a rocket, regarded as a weapon of last resort since established doctrine calls for keeping the submarine farther away than this weapon's range.

ASW – Anti-Submarine Warfare; refers to the art and science of finding and destroying submarines, which is the job of maritime patrol aircraft and many surface vessels.

ASuW – Anti-Surface Warfare; refers to the art and science destroying surface vessels and land targets, which is the job of bomber pilots and a great many naval officers.

AWAC – Airborne Warning and Control; this is essentially the same as AEW, but with the added mission of directing the forces engaged in air-to-air combat. Typically, this mission is performed by the E3 Sentry, though the Hawkeye can do so as well.

- B -

Base Course – The direction a vessel is really traveling, although it may deviate from it for tactical reasons.

Battle Space – The area a commander has to work in, which affects many other factors in a battle including decisions about formations and deployments, detection, and tactics.

BDA – Battle Damage Assessment; refers to the art and science of finding out how much damage a strike actually did to a target. Historically, pilots nearly always overestimate the damage they inflict on a target; it could be covered in smoke and on fire when the camera-carrying planes go over, masking the true effect. BDA's should generally always be taken with a grain of salt.

Bingo – Refers to "Bingo Fuel," a pilot term indicating that there is just enough fuel for them to Return to Base (RTB).

Blip Enhancement – A technique used in EW that fools enemy radars. Many helicopters carry this device, which will return a much larger radar 'picture' than what the helicopter normally would; this can be interpreted by an enemy missile or radar operator into thinking the helicopter is actually a high-value target such as a ship.

Blue-Water – A synonym for deep water or large bodies of water. A blue-water Navy is one whose forces are capable of operating far out to sea and in many different parts of the world. The United States Navy is a blue-water navy.

Bogie (pronounced BOH-gee) – An unknown air contact.

Brown-Water – A synonym for shallow or coastal waters. A brown-water navy operates close to home, generally in or near its own coastal waters. The Argentinean Navy is one example of a brown-water navy.

- C -

CAP – Combat Air Patrol; this is the practice of stationing fighter aircraft near a naval group to protect it from enemy aircraft and missiles. Also, this term refers to the planes assigned to this mission.

Cavitation – At high speeds (which varies with ship type), propellers turn so fast that they form air bubbles. These air bubbles produce a large amount of noise as they collapse, making the vessel noisier and easier to detect.

CG – Designation for a Guided Missile Cruiser.

Chaff – Thin strips of aluminum or plastic dropped by aircraft or fired by ship-mounted mortars. These form 'clouds' of tin foil that return large signals to radars, meant mainly to confuse radar-guided missiles.

CIS – The Commonwealth of Independent States, formerly the Soviet Union.

CIWS – Close-In Weapon System; refers to a small-caliber, extremely high-rate-of-fire automated weapon system designed to shoot down missiles as they approach a ship. A good example is the U.S. Navy's Phalanx 20mm Gatling Gun - generally called "Sea Whiz". The original CIWS systems were so bulky and unwieldy that they earned the cynical acronym "Christ, It Won't Shoot."

CV – Designation for an aircraft carrier.

CVBG – Designation for a Carrier Battle Group - the primary surface formation of the United States Navy.

CZ – Convergence Zone; an effect of active and passive sonar; sound travels in miles-long arcs under the surface of the ocean, rising to the surface and arcing back underneath, producing a donut-shaped detection area (the Annulus).

- D -

DDG – Designation for a Guided Missile Destroyer.

- E -

ECM – Electronic Counter Measures; refers to the devices and tactics developed to prevent an enemy from determining the locations of friendly forces by detecting signals, including employing EMCON, AEW, and either tight beam communications or non-electronic communications (e.g. semaphore). ECM also includes Jamming.

ECCM – Electronic Counter-Counter Measures; refers to the devices and tactics developed to interfere with an enemy's ECM. Generally, with a lot of effort, the enemy's position can be determined by identifying the kind of ECM they're using. Failing that, ECCM can at least attempt to interfere with the enemy's signals to prevent them from gathering information.

ESM – Electronic Signal Measures; refers to the devices and tactics involved in gathering information about the enemy from detecting the enemy's signals. Generally, ESM involves getting bearings to the enemy's vessels from multiple locations to generate a more-or-less exact position at which to launch weapons.

Electronic Warfare (EW) – The devices and tactics involved in gathering information about the enemy and denying him the opportunity to do the same through the use of electronic signals - it includes Electronic Signals Measures (ESM - see above), Electronic Counter Measures (ECM - see above), and Electronic Counter-Counter Measures (see above).

EMCON – Emissions Control; refers to the tactic of limiting the electronic signals produced by a ship or group to deny information to the enemy. Also refers to the various Emissions Control states, which range from no transmissions to unrestricted transmissions.

- F -

FFG – Designation for a Guided Missile Frigate.

Flares – Extremely hot objects suspended by parachutes, dropped by aircraft to draw away attacking missiles.

- G -

Goblin – An unknown submarine contact.

Guided Weapon – A short-range weapon that is guided to its target by the aircraft that delivered it or by another aircraft (or also by

ground troops as well). These weapons are intermediate in range between Iron Bombs and Standoff Weapons.

- H -

Hard Kill – This term refers to incoming missiles that have been destroyed by gunfire or missiles, as opposed to Soft Kill. It also refers to incoming enemy planes that have been destroyed (see also Mission Kill, below).

HF – High Frequency; refers to a type of communication equipment, generally the least secure and the most detectable as its signal tends to spread over a wide area.

HVU – High Value Unit(s); refers to the units that a group of vessels have come together to protect and escort. Examples include Aircraft Carriers, Troop Transports, and merchant ships in convoys. Generally, the HVUs are the center of a group of ships. (See also Inner Screen and Outer Screen).

Hunter-Killer – A submarine whose mission is to find and destroy enemy submarines. This term can also refer to a surface ship or group with the same mission.

- I -

IADS – Integrated Air Defense System(s); refers to the combination of radars, missiles, guns, and control structures that constitute a nation's defense against incoming enemy aircraft and missiles, centrally controlled to provide the greatest protection.

Inner Screen – The vessels escorting and closest to HVU(s). Their primary mission is to provide air defense, while their secondary mission is to destroy or drive off approaching enemy submarines.

Iron Bombs – Air-delivered weapons with neither propulsion nor guidance. These are the oldest kind of bombs, and aircraft delivering them are rendered extremely vulnerable to the defender's weapons.

- J -

Jamming – The devices and tactics involved in interfering with the enemy's detection signals, jamming makes the enemy's sensors less effective; if done properly, they can be rendered totally ineffective.

Jumping Jacks – A search pattern employed by helicopters. It consists of flying low for several miles with search radar off and then popping up to a higher altitude while the search radar is activated.

- L -

LORCAP – Long Range Combat Air Control; refers to a version of CAP in which fighters are deployed over a distant area (often a friendly force or a likely enemy approach). A LORCAP usually forces the fighters to carry fewer missiles and more fuel.

- M -

Mission Kill – Refers to an incoming enemy plane that was forced to turn away before it could attack. In this case, it survived but could not complete its mission. Also refers to ships (e.g. carriers cannot launch aircraft if turned away).

- N -

nm – Nautical Mile; the standard unit of measurement for distances at sea. Each nautical mile is 2,000 yards/6,000 feet/1.14 standard miles long.

- O -

OOB – Order of Battle; the forces (ships, aircraft, and personnel) available to a commander. In some contexts, this represents the forces of an entire nation.

OTH – Over The Horizon; refers to a method of detection and attack. Surface units can achieve over the horizon detection either via radar (sometimes) or via other units, such as aircraft (usually). Once the enemy units have been detected, an over-the-horizon attack can be launched with any suitable weapons, e.g. with Harpoon and Tomahawk missiles.

Outer Screen – The vessels escorting and farthest from HVU(s). Their primary mission is to destroy approaching enemy submarines, while their secondary mission is to provide air defense.

- P -

Passive – A method of detection, relying on detecting noise and signals generated by an enemy's unit; this method does not use Active methods (e.g. active pinging sonar) to locate an enemy unit, which can themselves be easily detected by other units. Passive methods of detection are therefore much preferred to Active ones.

Patrol Station AI – The computer controller responsible for maintaining user-created patrols. These patrols are replenished by launching an unassigned unit when the unit currently on patrol reaches Bingo fuel, Winchester, or is destroyed.

PIM – Path of Intended Motion; this is the course that a vessel intends to follow, and is essentially the Actual Course that the ship will follow in the future.

Pk – Probability of Kill; refers to the likelihood that a weapon will be able to reach a target. This factor is used in calculating the effectiveness of missile defense systems and in making decisions about launching attacks.

- R -

Racket – An unknown ESM Contact

ROE – Rules of Engagement; refers to the conditions under which a commander and his forces must operate. For example, a commander can't order his forces to attack a potential enemy until that enemy attacks first in peacetime, whereas he can take preemptive action in wartime.

SAM – Surface-to-Air Missile; refers to a missile launched from a ship or base to destroy aircraft, it is a pilot's worst enemy.

STOP – Simultaneous Time On Top; refers to the goal of all strike planners, which is to get all the diverse elements of a strike (ship launched missiles, aircraft with different speeds, etc.) to the target at the same time.

Skunk – An unknown Surface Contact

Soft Kill – Refers to the act of successfully luring an incoming enemy missile away from a friendly ship, usually with Chaff or Soids.

Soids – Refers to Flares that float on the water to draw away heat-seeking missiles.

SSM – Surface-to-Surface Missile; refers to a missile launched from a ship or base to attack another ship or ground target. SSMs are generally larger than SAMs and a lot larger than aircraft-carried missiles.

SSNDS – Designation for a nuclear attack submarine tasked with direct support of a surface force. It is generally employed as a distant anti-submarine picket.

Standoff Weapons – Refers to weapons that allow the aircraft delivering them to remain outside a target's Air Defense Envelope. These are usually missiles, such as the Harpoon.

SURTASS – Surface Towed Array Sonar System; a large, long-range towed array used to patrol ocean basins, essentially a strategic asset.

Surface Action Group (SAG) – Composed of a variety of surface combatants, but does not include the Aircraft Carrier. It is used for a variety of tasks, but its primary mission is to provide power projection or forward presence missions. In July 1986 the first battleship battle group to deploy to the Western Pacific since the Korean War included USS New Jersey (BB-62), USS Long Beach (CGN-9), USS Merrill (DD-976), USS Kirk (FF-1087), USS Thach (FFG-43), USNS Passumpsic (T-AO-107) and USS Wabash (AOR-5). A SAG mission in Harpoon 3TM might include moving forward to launch Tomahawk missiles against inland targets.

- T -

TASM – Tomahawk Anti-Ship Missile; this was the variant of the Tomahawk Cruise Missile designed to attack ships. It is the heavy hitter of the United States Navy's SSM arsenal and can be carried by large aircraft, surface ships, and submarines. The nuclear-capable version of the Tomahawk was removed from service in 1992, but conventional versions served well into the 1990's and beyond.

Threat Axis – The direction from which a unit or group expects an attack. In Harpoon 3TM, there are three threat axes: AAW, ASuW, and ASW.

TLAM – Tomahawk Land Attack Missile; this is the variant of the Tomahawk Cruise Missile designed to attack ground targets. It is the Navy's premier cruise missile and can be carried by large aircraft, surface ships, and submarines.

Topography, Surface – The features of a region above sea level, which play a large role in determining Battle Space and appropriate tactics.

Topography, Bottom – The features of a region below sea level, which play a large role in determining the tactics of submarines and the forces that hunt them.

- U -

UHF – Ultra High Frequency; this is a variety of communications signals that are the most secure and the least detectable because it does not tend to disperse much.

- V -

VLS – Vertical Launch System; this is the fastest way to get a lot of missiles in the air. This weapon system can be found on Aegis-equipped cruisers and destroyers and is scheduled to be installed on several other platforms as well.

VLF – Very Low Frequency; this type of signal is the only way to communicate with submarines more than a few feet below the surface. This signal requires an array of transmitters literally miles across to produce. It is also a very slow way to communicate, delivering only a few words a minute. It is mostly used to alert submarines to come to the surface for a UHF signal.

VHF – Very High Frequency; this type of signal is between UHF and HF with regards to detectability and security.

- W -

Winchester – A pilot term that indicates all weapons stores on their aircraft have been expended.

Zigzagging – This is the tactic of changing course on a seemingly random base to confuse the enemy about intentions and to make attacks (especially from submarines) more difficult.

2.2 Hot Keys

Although the use of a mouse is required to play *Harpoon 3™*, many commands and options may be selected using the keyboard. Throughout this manual the use of individual keystrokes and combinations of keystrokes are referred to as hot keys. A list of hotkeys is displayed below; please review this information to become familiar with them.

2.2.1 Numeric Keypad

IN ORDER TO UTILIZE THE NUMERIC KEYPAD ON YOUR KEYBOARD, ENSURE THAT THE NUMBER LOCK KEY IS TURNED OFF.

Key	Action
/	Course Tracks All/Sel/Off
*	Data Block All/Sel/Off
-	Decrease Time Compression
+	Increase Time Compression
7	Rename Unit/Group/Contact/Nav Zone
9	Display Groups/Units
5	Toggle Range/Bearings On/Off
3	Clear Old Contact
0	Add Reference Point
DEL	Delete Reference Point
Ctrl+7	Rename Reference Points

2.2.2 Function Keys

Key	Action
F1	Attack
F2	Speed/Alt/Depth
F3	Navigation Mode
F4	Formation Editor

F5	Logistics
F6	Air Ops
F7	Nav Zone Editor
F8	Window Preferences
F9	Sensors
F10	New Zoom Window
F12	Pause/Resume Game
Ctrl+F1	Bearing Only Attack

2.2.3 Regular Keys

Key	Action
~	Weapons Free
D	Detach Unit ((3.7.0) works on all map views when in Unit mode)
G	Group Selected Units
H	Mark the selected contact(s) as hostile
K	Mark the selected contact as “Probably Killed” *
M	Toggle GIS graphics
U	Unassign (tac map)
SPACE	
BACK SPACE	Select Previous Group/Unit

***** “Probably Killed” is a Battle Damage Assessment (BDA) state that prevents further attacks from being launched, but patrol and recon missions will still attempt ID and BDA on the contact. It can also be automatically assigned if a contact is stopped, not emitting or firing weapons, and not in BDA range of a friendly unit.

2.2.4 Sonobuoy Release

Key	Action
,	(3.7.0) Drop Passive* Sonobuoy
.	(3.7.0) Drop Active* Sonobuoy
[	Drop Directional Passive** Sonobuoy
]	Drop Directional Active** Sonobuoy
{	(3.7.0) Drop Best*** Passive Sonobuoy
}	(3.7.0) Drop Best*** Active Sonobuoy

* Drop Passive and Drop Active will drop omnidirectional sonobuoys if any are present, otherwise directional sonobuoys if those are present.

** Drop Directional Passive and Drop Directional Active will never drop omnidirectional sonobuoys.

*** Currently “Best” is interpreted as “least number available” among most suitable sonobuoys present. This is useful for dropping scarce attack localization buoys (VLAD, Barra, and CAMBS, for example) to nail down a contact detected the cheaper and more common LOFAR and DIFAR sonobuoys. The other keys select “greatest number available”.

2.2.5 Window Controls

Key	Action
F10	New Zoom Window

Z	Zoom In
X	Expand Out
F8	Window Preferences
T	Tracking Window On/Off
M	Toggle GIS Graphics
Shift-Click	to Select/Deselect multiple units/groups

2.3 Multiplayer

For up-to-the-minute multiplayer rules, please refer to the following URL:

http://mediawiki.advancedgaming.biz/index.php/H3ANW_MP

3.0 Interface

A ship in port is safe, but that's not what ships are built for.
-Grace Murray Hopper

One of the most striking things about *Harpoon 3™* is the use of a windowing interface. Using this interface will provide you with the flexibility to arrange the layout of your tactical display suit to your own particular needs and tastes. You may choose to display either one or multiple windows at the same time. Each window can be re-sized or "iconized" for later viewing by a simple double-click of the mouse. Each window has its own display preferences settings so you can have one window containing terrain and depth information, while another window displays weather information. There are many combinations available. There is an enormous amount of information in a *Harpoon 3™* scenario; the unprepared may easily become overwhelmed.

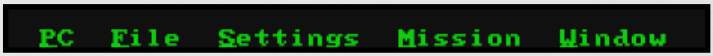
Your use of the interface to create a screen layout will make obtaining and managing the information easier. The interface gives you the versatility to customize the game display and set the level of detail that best suits your style of play and the tactical situations at hand.

3.1 Interface Basics

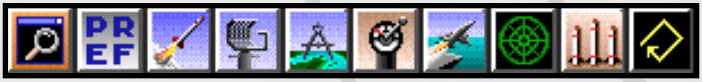
In order to make Harpoon 3TM easier to use, we gave it a windowing interface. If you are familiar with windowing interfaces (like Microsoft Windows), you might want to skip this section. If you haven't used windowing interfaces before, read on.

3.1.1 Menu Buttons

Buttons are raised areas (actually, they are drawn to look raised) on the screen. They generally represent options available to you within that window or box. For example, the only button in some dialog boxes is the one labeled OK, because all you can do is acknowledge that you have received the information. By contrast, the zoom map windows have multiple buttons to control game functions.



3.1.2 Toolbar Buttons



Each map window in *Harpoon 3™* has a row of colored buttons along the top of the map. These Toolbar Buttons are used to issue a variety of orders to your groups, units, or bases as well as provide visual information for each map. Use of each toolbar Button differs slightly. Each button will be explained later in this manual.

3.1.3 Radio Buttons/Check Boxes

Many of the dialog boxes and windows in *Harpoon 3™* use radio buttons and check boxes to enable certain game options. Unlike Menu and Toolbar buttons, Radio buttons and Check boxes have two states: selected and non-selected.

3.1.4 Pull-Down Menus

Harpoon 3™ has a **menu bar** across the top of the screen. This menu bar contains the features that apply to the entire game. In general, *Harpoon 3™* is arranged so that functions applying to the entire game (such as loading a scenario or setting time compression) are in the menu bar, while functions applying to specific units and groups are presented in windows and dialog boxes.

3.2 Mouse Basics

For those new to computer games or computer wargaming, this section will help clarify actions indicated throughout the remainder of the manual. Even those familiar with these concepts will want to review just to be certain nothing is overlooked.

3.2.1 Click

A click is quickly pressing and releasing the **left mouse button**. In *Harpoon 3™* (and other windowing applications, for that matter), this is generally the method for selecting an item from a menu or marking a point on a map. You don't need to worry about holding down the mouse; how long it takes to make the click doesn't matter. The only time you'd click with the **right mouse button** is when you want to center the map on the clicked location.

3.2.2 Double-Click

A double-click is two rapid clicks with the **left mouse button**. In *Harpoon 3™*, double-clicks serve several purposes. As in other windowing programs, double-clicking in a window's upper left corner closes the window. Most menu selections will allow you to double-click to highlight the particular selection and simultaneously select it, thus eliminating the need to click another button (such as an OK or CANCEL). Also, double-clicking on a target finishes the targeting procedure for all appropriate functions (from assigning attacks to landing aircraft).

3.2.3 Drag

A drag is performed by holding down the **left mouse button**, moving the mouse cursor to a new location, and releasing the left mouse button. Generally, this operation is used for making a user-defined

box (like a Zoom Map - see below) or drag-selecting several units. A drag can also be used to move an Icon or a window, both of which will be explained in detail below.

3.2.4 Mouse Cursor

The mouse cursor (generally an arrow) changes shape at different times to indicate different modes. Thus, when you are selecting a target for an attack, the mouse cursor will look like a targeting crosshair, while at other times it will be the traditional arrow, a pointer finger, or one of several other possibilities.

3.3 Windows

A window is a rectangular area of the screen bounded by a border. To differentiate it from a box, a window is sizable (that is, you can change its size).

3.3.1 Window Sizing and Closing

To change the size (and shape) of a window, move the mouse cursor to the edge of the window; when the cursor changes to a split arrow, hold down the mouse button and drag the edge of the window to where you want it. You can also change the size of a window by clicking on the up arrow in the upper-right corner; doing so will enlarge the window to its maximum size. If you want to restore a window to its former size after you've enlarged it, click on the button in the upper right corner with both up and down arrows. Note that when changing the size of the Main Map window it will stay proportional at all times since it represents the entire scenario map area. Zoom and Tracking windows behave differently as you will see later in the tutorials.

To close a window, double-click on the bar in the upper left corner. Note that there is no close button on the Main Map Window, so it cannot be closed.

3.3.2 Moving Windows

To move a window, move the mouse cursor to the title bar, hold down the mouse button, and drag the window wherever you would like the window placed. Release the mouse button when the window is in the area you desire. You should be careful about dragging a window too far off to the edge of the screen; once you do so, it will become difficult to manipulate it any longer. Also, if you encounter a situation where one window covers another there are five ways to gain access to the window "underneath": Close the covering window.

- Move the covering window.
- Send the covering window to an icon.
- Click on a portion of the covered window to bring it to the front.
- Use the Window pull-down menu and select the menu item in the lower portion of the menu list that bears the name of the window that is covered.

3.3.3 Iconizing or Minimizing Windows

To reduce a window to an icon, click on the down arrow in the upper right corner. An icon will appear bearing the name that was in the title bar of the window. You can then drag this icon to some out-of-the-way spot for later use by clicking on it and dragging it to the new location.

3.3.4 Icons

Icons are reduced, miniature windows that you can arrange on the screen to keep useful information out of the way but close at hand. For example, if you create a window around a unit to closely follow its course, you could then iconize that window and move the icon into a corner of the screen - nicely out of the way. When you want to see that window again, double-click on it to restore it to its former size and screen placement.

To restore an iconized window, double click on the icon. The window will reappear in its original location.

3.4 Dialog Boxes

A dialog box is a fixed area of the screen bounded by a rectangle. Unlike a window, a dialog box is not sizable, and often it is not moveable either. In *Harpoon 3™*, dialog boxes give you information from your staff, allow you to give orders to your units, and allow you to modify game settings like time compression.

3.5 Selecting

To do almost anything in *Harpoon 3™*, you have to select some item (a window, a unit, a menu choice, etc.). To select an item, move the mouse cursor to that item and click the mouse button once.

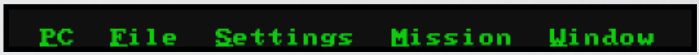
3.5.1 Selecting Multiple Items

A special case of selecting items is *Harpoon 3™*'s ability to allow you to select multiple items (units, groups, bases, and reference points). *Harpoon 3™* allows you to use two methods of selecting multiple items. First, you may drag a rectangle around all the items in an area; all of the items will be selected (though only appropriate ones will be included in the action). Second, you can use the mouse pointer and the shift key to select multiple targets. To do so, hold down the shift key and click on each item you want to select; then double-click while holding the shift key down on the last item. This method is useful for selecting some items in a crowded area with many items (units, bases, or reference points). Shift-click can also be used to deselect individual items as well.

4.0 Pull-down menus

The difference between a good and great officer is about ten seconds.
-Admiral Arleigh Burke

4.1 Pull-down Menu Selections



The menu bar at the top of the *Harpoon 3™* screen contain features that apply to the entire game. In general, *Harpoon 3™* is arranged so that functions applying to the entire game (such as loading a scenario or setting time compression) are in this menu bar, while functions applying to specific units and groups are presented in windows and dialog boxes. The menu bar contains the following items:

4.1.1 PC Pull-Down Menu

Clicking **PC** on the menu bar will produce a menu with the following four items:

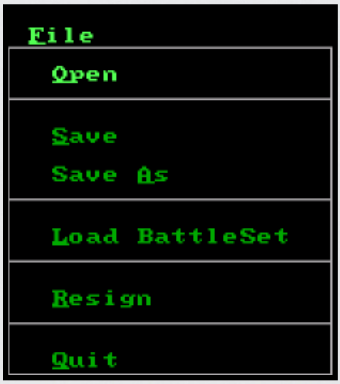
About Harpoon 3™ – About *Harpoon 3™* will show the names the *Harpoon 3™* Development Team and our dedicated Beta Testers.

Original Harpoon II Credits – Displays the original credits for *Harpoon II* including the names of the original *Harpoon II* Development Team and Beta Testers.

Original Harpoon II Tutorial – Displays the original *Harpoon II* tutorial.

Grab Screen – Grab Screen will take a screenshot of the *Harpoon 3™* window and save it in the ScreenShot folder on the drive where Harpoon 3 is installed. If the directory does not exist, it will be created.

4.1.2 File Pull-Down Menu



Clicking **File** in the menu bar will produce a menu with the following six items:

Open – Displays a window listing all the available scenarios and currently saved games. Clicking on an item in this list and **OK** will start a new scenario or return to a previously saved game. *Harpoon 3™* supports cross-platform loading and saving of scenarios. However, attempting to load a game saved from a scenario that was part of a Battleset you do not own will produce unpredictable results.

Save – Saves the game to a file with the same name you used last for this scenario. If you want to save the same game at two different points, or change the name of the saved game, select **Save As**.

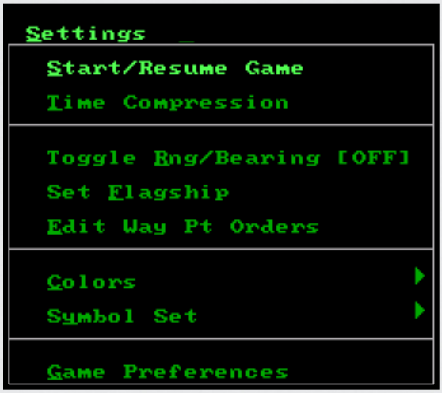
Save As – Displays a dialog box to enter a new file name in for this saved game. As noted above, this feature allows you to save the same scenario at different points. A .SAV extension is added by default.

Load BattleSet – Displays the Scenario Selection dialog box. Use this selection if you want to load a different scenario or if you want to restart the one you are currently playing. After a scenario is selected, the Side Selection dialog box will appear.

Resign – Select to quit a scenario and obtain an evaluation of your efforts to achieve victory conditions. The End of Scenario Evaluation screen also provides information about losses suffered by each side in the scenario and whether or not any rules of engagement were violated.

Quit – Exits *Harpoon 3™* and returns to the computer's desktop. A confirmation will be displayed first; if you want to use the Save or Save As command click on CANCEL and then save your game before quitting.

4.1.3 Settings Pull-Down Menu



Clicking on **Settings** in the menu bar will produce a menu with the following eight items:

Start/Resume or **Pause** – The status of the game determines the value that is displayed. If a game is running, **Pause** is displayed, and clicking it will pause the game. If the game is paused, **Start/Resume** is displayed, and clicking it will unpause the game.

Time Compression – Displays a dialog box that allows the adjustment of the time compression ratio, which ranges from one second = one second to one second = 30 minutes.

IN LARGER SCENARIOSL THE EFFECTIVE TIME COMPRESSION MAY SLOW DOWN AS THE PROGRAM HAS MORE WORK THAN CAN BE DONE IN ONE SECONDM

Toggle Rng/Bearing [ON/OFF] – This menu item has two configurations. If Ranging is currently turned off, **Toggle Range/Bearing [OFF]** will be displayed; if Ranging is currently turned on, **Toggle Range/Bearing [ON]** will be displayed. Turning Ranging on causes the distance and bearing between consecutive mouse clicks within either the main map or a zoom window (or even across windows) to be displayed in the Incoming Message window. To determine the distance between two groups, for example, you should turn on this feature, click on one group, and then click on the other group. When you click on the second group, the range, bearing, depth, and position (in latitude and longitude) will be displayed in the message window. This function can also be toggled by using the correct hot key.

Set Flagship – Allows you to change to a new flagship (which is essentially the center of your communications network); this feature is useful if your current flagship is threatened or has moved to a disadvantageous position. To set a new flagship, click on the desired ship and then select **Settings** and **Set Flagship**. Setting a new flagship moves the center of your side's communications net to the newly selected platform (a flagship can be any manned platform with communications gear - ships, subs, airplanes, but not missiles or the group symbol). The newly selected flagship must be on the current communications network for this function to work.

Edit Way Pt Orders – To edit the orders assigned to a particular waypoint, first select a waypoint and then click on Edit Waypoint Orders. A box will appear with a listing of the orders assigned to the currently selected waypoint. You may delete any order by selecting it and then clicking on the Discard Order button. To add a different order, select the waypoint and use the toolbar button for the particular order you wish to assign to that waypoint.

Colors – *Harpoon 3™* provides the user with the ability to change the colors used to represent the interface, maps, and the game elements (such as symbols). There are three ways to change the colors:

- Load a Default Palette
- Load a User Palette
- Create a New Palette

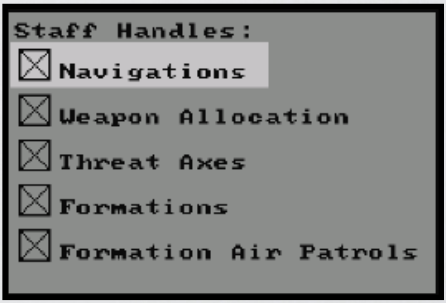
Symbol Set – *Harpoon 3™* comes with two sets of platform (ship, sub, aircraft, and base) symbols: **Stylized** and **NTDS**. **NTDS** stands for **N**aval **T**actical **D**isplay **S**ystem. The NTDS symbols are adapted from the symbols actually used by the United States military and many other western navies. Stylized symbols are actual images of boats, ships, planes, etc. familiar to most wargamers.

Game Preferences – Displays a variety of preferences that you can set. Refer to the next section for details.

4.2 Game Preferences

4.2.1 Setting Game Preferences

Click on the Game Preferences selection under the Settings pull-down menu to bring up the window containing a variety of preferences that you can set for the following areas:



4.2.1.1 Staff Handles

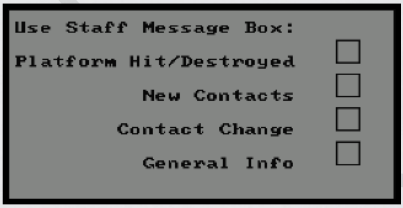
When selected, your Staff will handle operations related to the following:

- **Navigation –** When drawing a course across land for a ship or sub, or through a Nav Zone for affected units, the Staff will navigate the portion of the course that is restricted and proceed with an alternate course to reach the desired destination.
- **Weapon Allocation –** When attacking, the Staff will automatically allocate the proper weapon(s) to the selected target(s).

- **Threat Axes** – The Staff will assign the ASuW, and AAW threat axes for the Formation Editor to use.
- **Formations** – The Staff will create formations for any groups. Patrol Zones will be established for each unit in the group.

- **Formation Air Patrols** – The Staff will assign aircraft attached to the units or bases in the group to automatically conduct AAW and AEW air patrols within the group's formation.

4.2.1.2 Use Staff Message Box



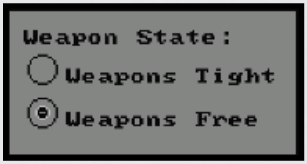
Text Message Boxes can be used in addition to sounds to announce the following events:

- **Platform Hit/Destroyed** – Any time a platform is hit, damaged, or destroyed.
- **New Contacts** – Any time a new contact is detected.
- **Contact Change** – Any time a contact is lost.
- **General Info** – Information about units being damaged, damage control activities, aircraft ready status, and many other routine messages.

IF YOU DO NOT HAVE SOUND CAPABILITY FOR YOUR COMPUTER IT IS RECOMMENDED THAT YOU CONFIGURE ALL THE STAFF MESSAGES TO BE PRESENTED IN MESSAGE BOXESM

FURTHERMOREL WHEN A STAFF MESSAGE WINDOW IS DISPLAYEDL TIME COMB PRESSION WILL AUTOMATICALLY RETURN TO ONE SECOND UNTIL THE WINDOW IS CLOSEDM IF YOU SELECT KEEP IJIL THEN THE GAME WILL REVERT TO ONE SECB OND AFTER THE WINDOW IS CLOSEDM

4.2.2 Weapon State



Units in *Harpoon 3*™ that are not assigned to a mission will automatically engage incoming air and missile threats if the Weapon State is set to **Weapons Free**. To prevent units from engaging air and missile threats on their own, the Weapons State can be set to **Weapons Tight**. The initial default setting for Weapon State is Weapons Free.

CAUTIONJ SETTING THE WEAPONS STATE TO WEAPONS TIGHT WILL PREVENT YOUR FORCES FROM DEFENDING THEMSELVES AGAINST AIR AND MISSILE ATTACKSM ALSO NOTE THAT CLOSING TO INTERCEPT EFB FECTIVELY PLACES THOSE UNITS ON A MISSIONL MEANING THEY WILL REACT AS IF WEAPONS FREE IS SELECTEDM

4.2.2.1 Weapons Tight

All weapons launches will be executed by the user except for units assigned to a mission.

4.2.2.2 Weapons Free

Units and groups will attack air and missile threats on their own. The user may still intervene and launch weapons as well.

4.2.3 Video Options
[076]

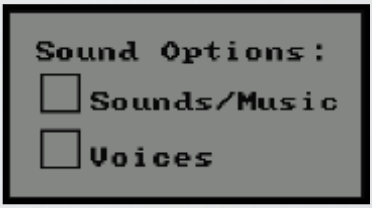
4.2.3.1 Show Video

Select to display launch and hit videos during the game.

4.2.3.2 Video Persist

Selecting this option sets the video display to remain open following an event that activates a video sequence, such as a weapon launch. Having the video display remain open provides the user the ability to drag the video display box to any location on the screen. To move the video display, left click and hold on the top bar of the video box, drag it to a new location, and release the mouse button. Once the video display has been moved, all video sequences will be displayed at the new location unless moved again. While the video display is persistent, it may be closed by clicking on the center of the box. Turning the Video Persist selection off will enable the video display to close itself following a video sequence.

4.2.4 Sound Options



4.2.4.1 Sounds/Music

Select to enable sound effects to play during the game. Sound effects include the following:

- Weapons Firing or Launching
- Aircraft Launching
- Explosions
- Button Clicks

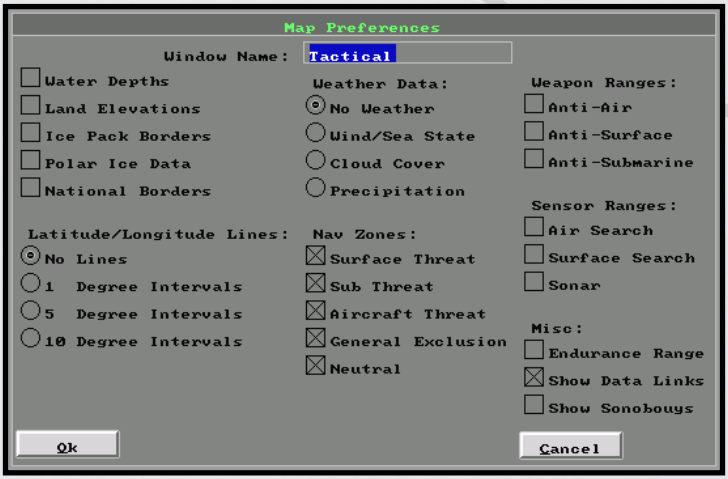
4.2.4.2 Voices

Select to enable voice sounds to play during the game. Voice sounds are used to announce the following:

- New Contacts
- Contacts Lost

Map Preferences –Map preferences can be accessed for each Zoom Map with the PREF toolbar button. Refer to the next section for details.

4.3 Map Preferences

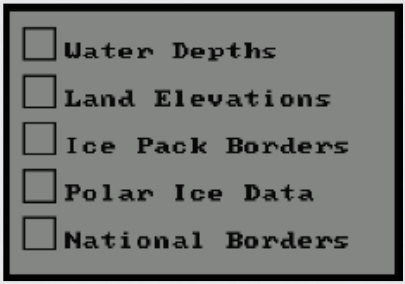


To activate the various map display options, click the PREF toolbar button. This is the Map Preferences button and will display a dialog box with a variety of display options which may be selected. It is important to note that you may set a combination of display preferences in each individual window. Each window may have an independent set of preferences. Use this feature to create windows containing a variety of display information. The following map display options are available:

4.3.1 Window Name

To change the name you see displayed in the title bar of a window, click on the text and type the new name. The window names can be changed during a game to keep track of various areas, units, or groups. Be aware that long names will not be practical when the map window is in icon form. Use small names or abbreviations when naming windows.

4.3.2 Terrain



4.3.2.1 Water Depths

Water depths are represented by colored tick marks every 30 minutes of map distance. The water depth scale is represented for three levels: 10, 100, or 1000+ meters. Tick marks are placed in 30 minute (one-half degree or 30 nautical miles at the equator) intervals on the map. The colors used to represent the depth bands may be changed by clicking **Settings**, **Colors**, and **Map Colors**.

4.3.2.2 Land Elevations

Land elevations can be displayed in 500 meter bands starting at sea level (0 meters) and going up to 2500 meters. Each band can be represented by a colored tick mark. Tick marks are placed in 30 minute (one-half degree or 30 nautical miles at the equator) intervals on the map. The color of the tick mark indicates the elevation for that particular area on the map. The size of the tick mark will depend on the size of the map area represented by the map window and the level at which the map is magnified. The colors used to represent the elevation bands may be changed by clicking **Settings**, **Colors**, and **Map Colors**.

4.3.2.3 Ice Pack Borders

Displays polar ice pack borders when selected. Ice packs will only be displayed in scenarios taking place close to the polar regions of the world. Surface ships cannot traverse across polar ice. Ice packs are represented on the map as a line similar to coastlines; think of them as a variable coastline that changes with the seasons.

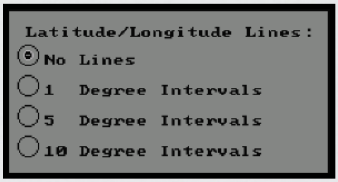
4.3.2.4 Polar Ice Data

When selected, the entire area defined by the Ice Pack Borders will be displayed.

4.3.2.5 National Borders

Displays national borders when selected. Borders are represented as lines within the land masses on the map. *Harpoon 3™* has two border sets: Cold War (e.g., West and East Germany) and Post-Cold War (e.g., a unified Germany), depending on the scenario.

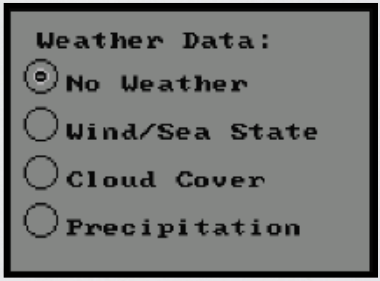
4.3.3 Latitude/Longitude Lines



Latitude and Longitude can be represented on any map. Selections include **no lines** or lines at **1**, **5**, or **10** degree intervals.

4.3.4 Weather Data

Harpoon 3™ contains a global weather model that creates the weather conditions most likely to be found in the geographic region in which the scenario takes place. The following weather display choices are available:



4.3.8.1 No Weather

No weather information will be displayed on the map.

4.3.8.2 Wind/Sea State

Color coded tick marks similar to the land elevation and depth information will be displayed. The colors vary with the speed of the wind in each half degree interval.

4.3.8.3 Cloud Cover

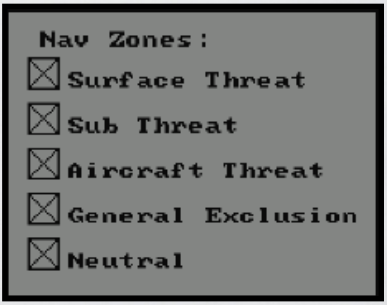
The color tick marks represent the type of cloud cover in a given area. The categories for cloud cover are Clear, Scattered, Partly Cloudy, and Overcast.

4.3.8.4 Precipitation

The color tick marks represent nine categories of precipitation, which include three levels of fog, three levels of rain, and three levels of snow. No precipitation is present if no tick marks are displayed. Colors used for weather data can be found in the **Weather Legend** under the **Window** pull-down menu. The colors may be changed by clicking **Settings**, **Colors**, and **Weather Colors**.

4.3.5 Nav Zones

Navigation, or "Nav" Zones, are areas that can be designated as off-limits to all or some of your units.



4.3.9.1 Surface Threat

A Surface Threat Nav Zone will exclude all surface ships from entering the zone. Aircraft and submarines are unaffected by this type of Nav Zone. You may create, modify, or delete this type of Nav Zone.

4.3.9.2 Sub Threat

A Sub Threat Nav Zone will exclude all submarines from entering the zone. Aircraft and ships are unaffected by this type of Nav Zone. You may create, modify, or delete this type of Nav Zone.

4.3.9.3 Aircraft Threat

An Aircraft Threat Nav Zone will exclude all aircraft from entering the zone. Submarines and ships are unaffected by this type of Nav Zone. You may create, modify, or delete this type of Nav Zone.

4.3.9.4 General Exclusion

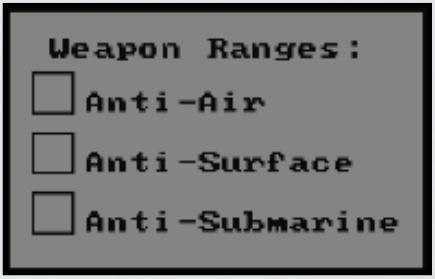
A General Exclusion Nav Zone will exclude all units, aircraft, ships, and submarines, from entering the zone. You may create, modify, or delete this type of Nav Zone.

4.3.9.5 Neutral

Similar to a General Exclusion Nav Zone, a Neutral Nav Zone will exclude all units, aircraft, ships, and submarines, from entering the zone. You may not create, modify, or delete this type of zone. Most Neutral Nav Zones will be created when the scenario is designed and will be present from the start of the scenario. To display the various Nav Zones, you would select each one so an "X" appears in the boxes.

4.3.6 Weapon Ranges

Weapon ranges are displayed for units, not groups. To display the approximate ranges of your unit's weapons, make the following selections as necessary:



4.3.10.1 Anti-Air

Displays a ring depicting the approximate range of the farthest reaching AAW weapon for each platform.

4.3.10.2 Anti-Surface

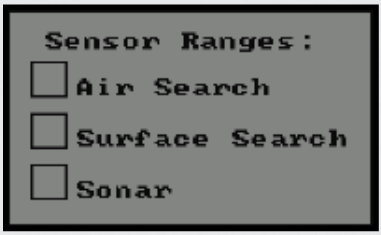
Displays a ring depicting the approximate range of the farthest reaching ASuW weapon for each platform.

4.3.10.3 Anti-Submarine

Displays a ring depicting the approximate range of the farthest reaching ASW weapon for each platform.

The colors used for weapon range circles can be found in the **Tactical Legend** under the **Window** pull-down menu. The colors may be changed by clicking **Settings**, **Colors**, and **Game Colors**.

4.3.7 Sensor Ranges



Like weapon ranges, sensor ranges are displayed for units only. To display the approximate ranges of your units' sensors, make the following selections as necessary:

4.3.11.1 Air Search

Displays a ring depicting the approximate range of the farthest reaching AAW sensor for each platform.

4.3.11.2 Surface Search

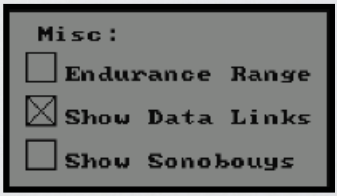
Displays a ring depicting the approximate range of the farthest reaching ASuW sensor for each platform.

4.3.11.3 Sonar

Displays a ring depicting the approximate range of the farthest reaching ASW sensor for each platform.

The colors used for sensor range circles can be found in the **Tactical Legend** under the **Window** pull-down menu. The colors may be changed by clicking **Settings**, **Colors**, and **Game Colors**.

4.3.8 Miscellaneous



4.3.8.1 Endurance Range

Select this item to display the approximate range each platform has based upon its current fuel state and speed. This applies to units only.

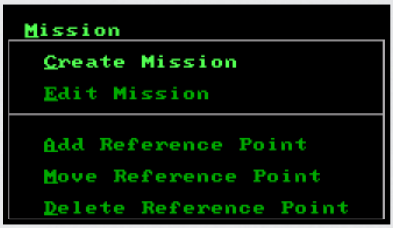
4.3.8.2 Show Data Links

Data Links are used to relay communications, sensor, and contact information between platforms. Data links can only be established between units with operational communications equipment that are in range of one another. A data link provides the ability to "see" things from the point of view of another platform. Think of a data link system as a network of sensors and communications equipment. If you select the Show Data Links selection, the links will be represented by thin lines between the data link capable platforms on your side.

4.3.8.3 Show Sonobuoys

Select this item to display individual sonobuoys on the map. Sonobuoys are dropped into the water by ASW aircraft and have their own sensor range circles and data link lines. Because many sonobuoys on the screen can clutter the view, it is a good idea to only use the **Show Sonobuoys** display option in windows that are being used for ASW operations.

4.4 Mission Pull-Down Menu



The Mission pull-down menu is used to access the *Harpoon 3™* Mission Editor feature which allows units or groups to perform a variety of different task organized missions. Assigning units or groups to missions offers the user the flexibility of allocating various assets to perform specific functions continuously during a *Harpoon 3™* session. Once units or groups are assigned to a mission, they will automatically launch, transit, patrol, detect, and in most cases, prosecute enemy contacts. Missions are more than just patrols. They can also be modified as the tactical situation changes during a scenario.

There are four types of missions: **Transit**, **Strike**, **Area**, and **Reconnaissance**. The **Mission** pull-down menu allows you to add, move, and delete reference points. It also allows you to create and edit missions.

Create Mission – Some missions require Reference Points while others require a target type be designated. Please refer to the Missions section (23.0) for detailed information on how to create missions.

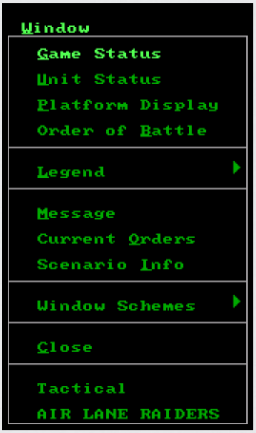
Edit Mission – After a mission has been created, units or groups need to be assigned before the mission may commence. The Mission Editor can be accessed two ways: first by clicking **Edit Now** when creating a mission with the Create Mission window and pressing **OK**; secondly, by clicking **Missions** and **Edit Mission**. Please refer to the Mission Editor section (9.2.9) for detailed information on how to edit missions.

Add Reference Point – Use the Add Reference Point selection from the Mission pull-down menu to add a Reference Point to the map. Once Add Reference Point is selected, the mouse cursor will change to a pointer finger. Place the cursor where you want the Reference point to appear and click once. Please refer to the Reference Point section (6.6) in Lesson II for a detailed explanation of Reference points.

Move Reference Point – Reference Points can also be moved to another location. Select the Reference Point you want to move and then click **Mission** and **Move Reference Point**. The mouse cursor will change to the pointer finger. Place the mouse cursor on the new location and click. The selected Reference Point will move to the new location. Note: there are some reference points in the scenario that have a 'locked' status. These points cannot be moved. Please refer to the Reference Point section (6.6) in Lesson II for a detailed explanation of Reference points.

Delete Reference Point – To delete a Reference point, click **Mission** and **Delete Reference Point**. The mouse cursor will change to the pointer finger. Place the mouse cursor on the Reference Point you wish to delete and click once; the Reference Point will disappear from the map. Please refer to the Reference Point section (6.6) in Lesson II for a detailed explanation of Reference points.

4.5 Window Pull-Down Menu



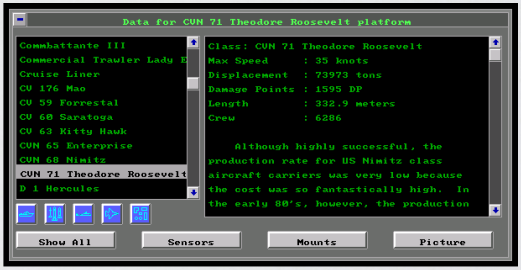
The Window pull-down menu displays the following ten items:

Game Status – This will open the **Game Status window** or, if it is already open, brings it to the front. This window displays the current game time, date, and the time compression ratio.

Unit Status – This will open the **Unit Status window** or, if it was already open, brings it to the front. The Unit Status window provides information about a selected unit's status including speed, course, altitude or depth, and emission state. A Report can be accessed from this window that provides details about a unit's weapons and sensors. Clicking on the Database button brings up the Platform Display dialog window.

Platform Display – Opens the Platform Display dialog window. The Platform Display displays text and picture information about the individual platforms contained in the *Harpoon 3™* database.

The window displays the possible platform/system types in the left-hand window; anything selected in this left window will have a description and other information displayed in the right-hand window.



Each of the five blue buttons at the bottom left of this window allow you to select the type of unit you would like to view. From left to right these are **Ships**, **Weapon Systems**, **Submarines**, **Aircraft**, and **Facility Emplacements**.

Along the bottom of the window are a series of buttons:

Show Selected – Displays the selected item.

Sensors – Displays a list of sensors available to the selected item.

Mounts – Displays a list of mounts (emplacements) capable of utilizing the selected item. If you select this, a Weapons button will be displayed; select the mount from the left window and click Weapons to view the types of weapons used in them.

Picture – Displays a picture (if available) of the selected item.

Order of Battle – Clicking on this selection will open a box containing a complete listing of all of the groups, units, and bases currently under your command. Please refer to the Order of Battle section (6.5.13) for further details.

Legend – There are four sets of legends that can be selected from the Legends sub-menu. Please refer to the Legends section (6.5.14) for further details.

Message – This opens the Message window or, if it was already open, brings it to the front. General information about contacts, unit status, range and bearing information, and much more is displayed in this window. It is recommended that you always have this window open while playing Harpoon 3TM. Please refer to the Message Window section (6.5.15) for further details.

Current Orders – This opens the Current Orders window or, if it was already open, brings it to the front. The Current Orders window contains the same orders that are available from the Scenario Selection menu.

Scenario Info – This opens the Scenario Information window or, if it was already open, brings it to the front. This is the same information that is displayed from the Load BattleSet dialog box.

Close – Deletes the currently active window.

THE MAIN MAP WINDOW CANNOT BE CLOSEDM

Windows Currently Open – At the bottom of the Window pull-down menu, all windows currently open are listed. Click on any of them to bring that window to the front of the display. This feature is useful when you have many windows open and some are obscured by others and you need to view a window that is beneath others.

5.0 Toolbar Buttons

The reason that the American Navy does so well in wartime, is that war is chaos, and the Americans practice chaos on a daily basis.
-Admiral Karl Doenitz

Toolbar buttons are used to give commands to your forces and configure game maps. Toolbars are found only with Map Windows. In most cases, a unit or group must be selected before using a toolbar button to issue commands. Below is a listing of each toolbar button and its function:

5.1 Main Window Toolbar

Zoom Window

A Zoom Window can be created by first clicking on the Zoom Window toolbar button. The mouse cursor will resemble a "+". Place the mouse cursor at any location on the map area and drag a box as you hold the mouse button down. Once you release the mouse button, a new map window will appear. Please refer to the Zoom Window section (5.2) for further details.

PREF

Activates various map display options. It is important to note that you may set a combination of display preferences in each individual window; each window may have an independent set of preferences. Use this feature to create windows containing a variety of display information. Refer to the Map Preferences section (4.3) for further details.

Attack

There are several ways to attack targets in *Harpoon 3™*. An attack can be a manual engagement where the user orders a specific unit or group to engage a target. Attacks can also be made automatically by assigning units or groups to either a Strike or a Patrol Mission. Attacks can be made against a known target that is currently in range, or when the exact location of the target is unknown an attack can be made as a bearing-only launch. Units or groups can also be ordered to close and attack when they are currently out of range of a target. Refer to the Attack section (8.0) for further details.

Sensor

To change sensor settings, select a unit, group, or base to change it for and click this toolbar button. This will produce a small dialog window with several options, including **Radars**, **Sonars**, **ECM**, and **Comm Link**. These sensors can be set to **Active**, **Passive**, or **Intermittent**. Refer to the Sensor section (11.0) for further details.

Navigation

Allows you to tell a unit or group where to move to. To use the Navigator, first click on the unit or group you want to move and then click this button; the mouse cursor will change to

a pencil shape. Using the pencil cursor, click on where you want the unit or group to move to. You can enter several points for a unit at a time by continuing to click on new places on the map. Each time you click you will place a small circle with line segments connecting the circles. These small circles are called waypoints. After a course has been plotted, the user can select individual waypoints to either move or delete them. Refer to the Navigation section (7.0) for further details.

Speed/Altitude/Depth

To change the speed, altitude, or depth of a unit or group, first select the unit or group and then click this button. This will produce a dialog window with settings appropriate to the type of unit or group you've selected. Thus, surface and submarine units can have speed settings from Stop to Flank, while aircraft units can have speeds from Loiter to Afterburner (if that speed is available for that type of aircraft). Subs will have depth settings and aircraft will have altitude settings. Also, you can enter an exact speed, depth, or altitude in the text block as appropriate.

Air Ops

All of the operations involving aircraft in *Harpoon 3™* can be controlled by using this button. The Air Ops toolbar button is one of the most versatile controls used in *Harpoon 3™*. Refer to the Air Ops (10.3.3.5) section for further details.

Formation Editor

Used to position units in the best possible configuration to meet potential threats. Units properly configured and assigned to their most capable missions will provide the best possible defensive and offensive capability for the group. Besides the obvious placement of units in relation to each other, the Formation Editor also allows the user to assign individual units in the formation to specific Patrol Zones. Refer to the Formation Editor section or Lesson VII (5.3 or 6.12) for further details.

Logistics

If the Aircraft Logistics difficulty setting is set to ON, the Logistics toolbar button can be used to refuel and resupply ships. Ordnance for carrier-based aircraft can be provided to carriers. The ability to conduct aerial refueling, while a logistical operation, is executed using the **Air Ops** toolbar button and is covered in the Air Ops section (10.3.3.5) of this manual; please refer there for further details.

Nav Zone

Navigation or "Nav" Zones are areas that can be designated as off-limits to all or some of your units. Nav Zones are used to prevent your *Harpoon 3™* Operating Instructions units from navigating into areas because of threats, rules of engagement restrictions, or to avoid detection ranges of known enemy units or facilities. Refer to the Nav Zone section (6.6.3) for further details.

5.2 Zoom Functions

Zoom In

Causes the area displayed by the window to become smaller, producing a close-up view of the area; this button can be clicked on many times, creating a steadily closer view. Note that *Harpoon 3™* is capable of displaying a map area of a few feet across if you zoom in far enough. There is no Zoom In button for the Main Map window.

Zoom Out

Causes the area displayed by the Zoom Window to become larger. There is no Zoom Out button for the Main Map window.

Zoom Window

Creates a manually-created zoomed-in Window. The mouse cursor will resemble a plus sign (**+**). Place the cursor at any location on the map area and drag a box as you hold the mouse button down. Once you release the mouse button, a new map window will be displayed. Refer to the Zoom Window section for further details.

Tracking Window

To turn a Zoom Window into a Tracking Window, first click the unit you would like the window to track and then click this button; the title bar will change to indicate that this window is now a Tracking window. You can change a Tracking window back into a Zoom window by clicking on the Track Unit/Group button again. Use the Map Preferences toolbar button to rename the Tracking Window.

5.3 Formation Editor Toolbar

The Formation Editor should be thought of as manipulating a circle; Patrol Zones are a slice of this circle. There can be no square-shaped patrol areas.

Patrol Zone Formation

Allows the creation of a Patrol Zone.

Threat-Axes-Tracking Formation Editor

One of the more advanced features of the Formation Editor as it allows you to "tag" a threat axis to the contact you wish to track. To activate this feature, click on the axis you would like to assign to a particular contact, making sure the type of axis you pick matches the contact type you would like to track. Single click your tactical display window and then double click the contact you would like to track. Your axis is now locked on that contact and will shift appropriately until you reassign it or the contact moves outside sensor range. If the contact is lost the axis will stay oriented toward the last known bearing of the contact.

Detach Unit Formation Editor

Clicking a unit in the Formation Editor and clicking this button will detach a unit from the group.

CPU Formation Editor

This button allows you to hand over the control of a unit within a formation to the AI. The AI will then assign to an axis and threat zone. The AI will also gain control of all the aviation units of that vessel. To activate this feature, first select the unit by clicking it within the Formation Editor and then click this button. To cancel this feature, reassign the vessel within the formation editor.

6.0 Tutorial

We make war that we may live in peace.
-Aristotle

The *Harpoon 3™* Tutorial has been designed to take you through a series of lesson scenarios. These lessons will familiarize you with the interface while demonstrating how to use each command and menu function in *Harpoon 3™*. The *Harpoon 3™* Tutorial is a wise investment of your time; you can learn while playing.

6.1 Loading the Tutorial

Select the Tutorial by placing the mouse cursor on the word "Tutorial" and clicking with your left mouse button. Once you have selected the Tutorial from the Scenario Selection dialog box, you will see a set of Lesson Scenarios displayed to the right side of the dialog box. Each of these lessons focuses on a particular series of commands and functions in Harpoon 3.

We will start with **Lesson I: Orientation**. Select the first scenario of the Tutorial by either double-clicking on the scenario name or by clicking once on the scenario name and then on **OK** in the lower left area of the Scenario Selection dialog window.

While the scenario is loading watch the Incoming Message Window to see the various portions of the scenario as they are loaded into the computer's memory.

6.2 Choosing Sides

Once the scenario has loaded, you will be asked to choose sides. Click on **Good Guys**.

6.3 Difficulty Settings

Press the **Difficulty** button to set the level of difficulty for the scenario you will be playing.

Easy: Beginner settings
Average: Novice settings
Hard: Expert settings
Default: User defined settings
Custom: Modified difficulty settings

The initial setting for *Harpoon 3™* is Default. For this tutorial select Easy and then OK.

6.4 Viewing Orders

After selecting your side and setting difficulty level, it is time to review your orders. Take a moment to read the scenario orders on the right side of the Side Selection window. You can use the scroll bar at the side of the orders window to read all of the orders. These orders can also be viewed at anytime while you are playing the game. Once you have reviewed your orders, click **OK**.

6.5 Lesson I: Orientation

Now that you have selected your side, examined your orders, and the scenario has been loaded, it is time to become familiar with the *Harpoon 3™* screen and the components of the interface.

6.5.1 Main Window

The Main Window depicts the entire map area of the scenario. In the Lesson I scenario the Main Window is currently in icon form and labeled "Lesson I." Double-click on this icon. The window will expand and the entire map area will be displayed. For this first Tutorial scenario, the only map features that are active are the coastlines and a single unit symbol. The unit represented here is the USS Lewis B. Puller. We'll learn more about the Puller later in this lesson.

6.5.2 Toolbar

Let's go over the components of the map. The map area itself is where the ocean, coastlines, groups, units, and bases are displayed. At the top of the display area is the toolbar containing the buttons used to issue orders to your units or change the window's features.

6.5.3 Map Preferences

To activate the various display options, click on the toolbar button marked PREF. This is the PREF toolbar button and will display an options screen with a variety of display options which may be selected. Each window may have an independent set of preferences. Use this feature to create windows containing a variety of display information. Let's try out the various Preferences. Go ahead and click the PREF toolbar button from the Main Window. The Map Preferences box should now be in the center of your screen.

Please refer to the Map Preferences section for a detailed explanation of the different settings. For the purposes of this tutorial you should have the following settings for Map Preferences:

Water Depths – **OFF**
Land Elevations – **OFF**
Ice Pack Borders – **OFF**
Polar Ice Data – **OFF**
National Borders – **OFF**
Latitude/Longitude – **NO LINES**
Weather – **NO WEATHER**
Nav Zones – All **OFF**
Weapons Ranges – All **ON**
Sensor Ranges – All **ON**
Data Links – **ON**
Show Sonobuoys – **ON**
Endurance Range – **OFF**

6.5.4 Creating Zoom Windows

A Zoom Window can be created by first clicking on the **Zoom Window** toolbar button. The mouse cursor should now resemble a plus sign (**+**). Place the cursor at any location on the Main Map area and drag a box as you hold the mouse button down. Once you release the mouse button, a new map window will appear. The new window is a Zoom Window labeled "Zoom Map 1." Note this new window has its own toolbar buttons. A Zoom Window will have the same preferences as the map from which it was originally created. If you wish to have different settings, use the Map Preferences button (PREF) for this new window to give it its own display parameters. Click on the PREF button in this new Zoom Window and rename it "Tactical View". Now grab the corner of Tactical View zoom window and stretch the window so it's big enough for you to see all of the toolbar buttons for this window. Unlike the Main Map window, zoom windows do not stay proportional and can be stretched to any size without distorting the map.

6.5.5 Centering the Screen

Since the map area displayed in the new Zoom Window is smaller than the Main Map, you can move around within the map and center it on any location. To center the map place the mouse cursor on the point you wish to designate as the new center of the map and click the right mouse button. The map should now be centered on the point where you clicked. Try it by clicking around and making various points on the map the center. This is a rapid means of traversing across the map surface in any direction.

6.5.6 Zooming In/Out

The new window has three toolbar buttons that were absent from the Main Map. The first two buttons are the **Zoom In** toolbar button and the **Zoom Out** toolbar button. Use these buttons to magnify or expand your view in the map. Try clicking the Zoom In button three times and watch what happens to the view in Tactical View; it should zoom in towards the map. Now click on the Zoom Out button three times. Doing this should have expanded the view back to where it was prior to using the Zoom In button. Go ahead and center the map on several areas using the center map feature described above and use the Zoom In and Zoom Out buttons to change the magnification of the view. For example, try centering the map on a coastline and then zoom in and out or center on the Puller and change the magnification. When you are comfortable with how these two buttons function, center the map around the Puller and zoom out enough to where you can see the Puller and some of the coastlines.

6.5.7 Creating Tracking Windows

Another toolbar button not found on the Main Map is the Tracking Window toolbar button. A Tracking Window allows the user to select a unit or group and center the map screen continuously on that unit or group. This means the window will keep the selected unit or group in the center of the window as it moves across the map. To create a Tracking Window, select the Puller. Next, click on the Tracking Window toolbar button. This should center the window on the Puller and the title bar for the window should now read "Tracking." You can use the PREF button to rename the window to whatever you choose. Go ahead and name the window "Tracking USS Puller." A Tracking Window can be changed back into a regular Zoom Window by clicking on the Tracking Window toolbar button again. Try it now. As you can see, the window returns to a normal zoom window and if you select tracking window again, the map centers on, and follows, the Puller. You will have to rename the tracking window each time you go from a tracking window to a normal zoom window. Go ahead and rename the window Tracking USS Puller.

6.5.8 Additional Window Types

There are a variety of windows used by the *Harpoon 3™* interface to display information. We have already learned about the map windows; now, we will take a look at the other types of windows that can be displayed using the Window pull-down menu.

6.5.9 Game Status Window

The Game Status Window provides you with the current game time, and time compression ratio. In this Tutorial scenario the Game Status Window is already active. If it had not been, you would have needed to select Game Status Window from the Window pull-down menu. The Game Status Window can be moved anywhere on the screen. To display the Game Status Window after it has closed, use the Window pull-down menu selection and select Game Status Window. As you can see, the current game time is 12:00 noon on January 1, 1994 and the game is currently paused. The time is displayed in Greenwich Mean Time (GMT) which is also referred to as "Zulu" time.

6.5.10 Unit Status Window

The Unit Status Window contains information relating to the current unit or group that is selected. The Unit Status Window is already active in this Tutorial scenario so we do not need to use the Window pull-down menu to create it. If the Unit Status Window was not active, you would need to click **Window** and **Unit Status Window**. Go ahead and select the ship symbol in the middle of the main window. The Unit Status Window should now show you that the selected ship is the USS Lewis B. Puller, an Ingraham-class guided-missile frigate, operating on the side of "The Good Guys." The Puller has a speed of 5 (creep) and has no damage. The current endurance in hours and the current Emission Control (EMCON) state is displayed. The Puller is not currently assigned to a Mission and awaits your orders. Had the Puller been an aircraft, submarine, or unknown contact, the Unit Status Window would differ slightly. We will note the differences for these other types of platforms later in the Tutorial. There are two buttons in the Unit Status Window, the database button and the Report button.

6.5.11 Database Window

Finally, click on the **Database** button. Selecting this button brings up the Platform Database entry for the USS Puller. You can also view the platform database by selecting the Platform Display selection from the Window pull-down menu.

By clicking one of the corresponding **Platform Selection Button** in the database window you can view detailed information on ships, weapons, subs, aircraft, and facilities. Press Show All (or Show Selected) to toggle between the currently selected unit and all of the items in the database.

By clicking the corresponding **Sensors and Mounts button** on the database window it is possible to view weapons and sensor information. Close these windows by double-clicking the button in the upper-left corner.

Many platforms have a **Platform description text**. Scroll through the data text for the Puller to learn more about its specifications and to read a brief description of the O.H. Perry-class guided-missile frigate.

Some platforms have a **platform image** in the database. To view a diagram and photograph of the Puller, click on the Picture button in the lower right corner. A window containing a line diagram and photograph of the ship class will appear on your screen.

6.5.12 Unit Report window

Close the Database window and click **Report** in the Unit Status window for detailed information about the current unit or base selected. The Report provides more detailed information than the Unit Status window. You will see sections of the Report window listing the weapons and sensors available to the Puller. You can use the scroll bar at the side of each section to view the entire weapon and sensor list. Go ahead and close the Report when you have finished reading it.

6.5.13 Order of Battle

Click on the Order of Battle selection in the Window pull-down menu to produce a listing of all the groups, units, and bases that are currently under your command. Close the Order of Battle box when you are finished viewing it.

6.5.14 Legends

There are four Legends to provide you with information about symbols and colors used to represent units & groups, map components, sensors, weapon ranges, and weather. Go ahead and select Legends from the Window pull-down menu and then select each of the following from the Legends sub-menu:

- The **Symbol Legend** depicts the symbols that represent various unit, group, base, and other "game pieces."
- The **Map Legend** depicts the colors used to represent various elevation, depth, weather, and Threat Zones.
- The **Tactical Legend** depicts the colors used to represent various sensor & weapons ranges, as well as contact status.
- The **Weather Legend** depicts the colors used to represent various weather-related information.

6.5.15 Incoming Messages Window

The Incoming Messages Window is where text information is presented. This window is already active for this tutorial scenario. Information about contacts, threats, and your own Damage Control will be displayed in this window. The location and size of the Incoming Messages window is up to you. It will appear at the bottom of the screen before and during the process of loading a scenario. After the scenario has loaded, the Incoming Messages window may appear in another location or may not appear at all, depending on how the scenario screen layout was saved when the scenario was last exited. You can also resize the Incoming Messages window to your liking. The following information is displayed in the Incoming Messages window:

If you select Toggle **Rng/Bearing** and click on it so that it reads **ON** in the Settings pull-down menu, the range and bearing between mouse clicks on any map window will be displayed in the Message Window. Altitude/depth and lighting conditions are also provided for each point. Go ahead and click **Settings** and **Toggle Rng/Bearing** so it reads **ON**. Now click anywhere on the map; click several times on the map to note the changes in range and bearing as you click. Once you are comfortable with the use of this feature, please turn it **OFF** until we need it later in the Tutorial.

The Message Window is the only window you will see on the screen as a scenario is loading and will indicate the **Scenario load status**. While a scenario is loading, it will indicate the various portions of the scenario that are being loaded into the computer's memory.

When a **platform is hit**, **sunk**, **or destroyed**, a text message will appear in the Message Window. If this event type is selected in the Game Settings then this text will also appear in a Staff Message window.

When a **platform is detected**, a text message will appear in the Message Window. If this event type is selected in the Game Settings then this text will also appear in a Staff Message window.

When a **contact is lost**, a text message will appear in the Message Window. If this event type is selected in the Game preferences then this text will also appear in a Staff Message Box.

General information regarding aircraft ready status, damage reports, mounts reloading, and other information will appear as text messages in the Message Window. If this event type is selected in the Game Settings then this text will also appear in a Staff Message window.

6.5.16 Current Orders

You can review your orders at anytime by selecting Current Orders from the Window pull-down menu. The orders are identical to the ones you viewed earlier after side selection. It is not necessary to have the orders displayed during the game. If you want, the Current Orders text can be reduced to an icon so that you can easily review them from time to time by double-clicking on the icon.

6.5.17 Scenario Info

You can review text information about the scenario you are currently running by clicking on Scenario Info from the Window pull-down menu. This information is identical to the Scenario Info available when selecting a scenario.

6.5.18 Display Features

The display features for *Harpoon 3™* are very flexible. The user may customize the display by changing the colors used or selecting from one of two sets of symbols.

6.5.19 Colors

Harpoon 3™ provides the user with the ability to change the colors used to represent the interface, maps, and the game elements (such as symbols). There are three ways to change the colors, but for the purpose of this tutorial we will only be covering one of them. Click **Settings** and **Colors**; a sub-menu should now be displayed to the side of the Settings menu. Click **Default Palettes**. You will be given the following five choices:

- Aegis Display
- Amber Display
- OJ-663 Display
- Grayscale Display
- Conventional Display

Select **Aegis Display**. Doing this should change the map colors on your display. Now, try the other selections. The OJ-663 Display is the initial default setting for *Harpoon 3™*. For the purposes of this tutorial, please reset the palette to OJ-663 before continuing with the lessons. Refer to section 4.1.3 for further details.

6.5.20 Choosing a Symbol Set

Select Symbol Set from the Settings pull-down menu. A sub-menu should appear offering the choice of either Stylized or NTDS symbols.

6.5.20.1 Stylized

Stylized symbols are more intuitively understood and are drawn to resemble various platforms. Because they are easier for new players to recognize, the stylized set is the initial default set for *Harpoon 3™*.

6.5.20.2 NTDS

Naval Tactical Display System symbols are based upon the symbols used by actual military systems. *Harpoon 3™* has been designed to resemble these actual military systems. To achieve true realism, users may consider learning and using the NTDS Symbology. After all, millions of your tax dollars went into the design of these symbols to make them easy to recognize. The *Harpoon 3™* Design Team invites you to learn these symbols and play *Harpoon 3™* as realistically as possible. They were designed to convey information without relying on context. This is important when a screen is crowded with symbols, time-pressure is high, and you are approaching information overload. Users can instantly see the relations and capabilities of a threat presented by a symbol with a minimal amount of thought.

6.5.21 Lesson Summary

That concludes **Lesson I: Orientation**. If you followed each step of the lesson you should now be familiar with each element of *Harpoon 3™*'s interface. You also learned to move about a map and how to create Zoom Maps and configure them to display a variety of information. Now that we are finished with the first lesson, let's move on to the next lesson. Click **File** and **Load BattleSet**. Once you have the BattleSet Selection menu up, select the **Tutorial BattleSet** and click **Lesson II: Plotting Course & Speed**.

6.6 Lesson II - Course & Speed

After you have selected Lesson II, select **Good Guys** as your side. Leave the Difficulty Settings as they are currently set. You should now be looking at a display almost identical to the Lesson I. Once again, the USS Lewis B. Puller is the lone unit on the map. We will be using the Puller to become familiar with navigation procedures for *Harpoon 3™*. Notice that there are three small "X's" located at various points on the map; these are **Reference Points**. We will be using them to assist us in our navigation lesson.

Reference Points can be placed anywhere on the map. Besides the obvious use in marking a particular location, Reference Points play an important role in mission planning. Use the Add Reference Point selection from the Mission pull-down menu to add a Reference Point to the map. Once Add Reference Point is selected the mouse cursor will change to a pointer finger. Place the cursor where you want the Reference point to appear and click once.

6.6.1 Showing Data Blocks

A Data Block is the text information displayed next to each unit, group, base, or reference point. Use the Show Data Blocks hot key to toggle the data block settings. There are three settings for Data Blocks:

- Data Blocks Off for all units
- Data Blocks On for all units
- Data Blocks On for the selected unit only.

Go ahead and try it – press the Show Data Blocks hot key several times and watch the map display. Also notice that the current setting is displayed in the Incoming Messages window. Data Blocks provide Unit/Group Designator (or name), course, speed, and when appropriate, altitude/depth. You should set Data Blocks to **ON** for all units for the remainder of this tutorial lesson.

6.6.2 Navigation

6.6.2.1 Drawing & Plotting a Course

Let's start by plotting a course to Reference Point 1. Select the Puller and then click the **Navigation** toolbar button. Your mouse cursor should now change into a pencil shape. Place the cursor at a point about one-third the distance from the Puller to Reference Point 1 and click with your mouse button. A line should appear from the unit symbol to the point where you clicked the mouse. If a line does not appear, try the course tracks hot key that toggles the display of course tracks for all units, the selected unit, and no tracks at all. Consult the Hot Keys section (2.2) to determine the correct key for toggling the course tracks. Once you are looking at the line you just created, notice at the point the line ends there is a small circle. This circle is called a waypoint. Halfway between the unit symbol and the first waypoint is a small triangle, this is called a midpoint. We will examine both the waypoint and the midpoint shortly.

For now, let's resume plotting our course to Reference Point 1. Place the mouse cursor on a point that is two-thirds the distance from the Puller to Reference Point 1 and click on that spot. Another line segment with a waypoint and a midpoint should appear. Now let's finish our course. Place the cursor at a point just beyond Reference Point 1 and click. A third line segment, waypoint, and midpoint should appear. You have now finished drawing the course to Reference Point 1. We are finished plotting the course so we need to exit Navigation mode. Click the **Navigation** toolbar button and your mouse cursor should now be back to normal (an arrow). After clicking this button, the Navigator now examines the course you have drawn and plots it. While you are in Navigation mode you are drawing the course, and when you exit Navigation mode the course is actually plotted and assigned to the unit or group.

6.6.2.2 Moving a Waypoint

Suppose you want to change the course you just plotted. Let's examine how to edit our existing course. First, let's say that we want to change the location of the final waypoint of our present course. Start by clicking on the **third waypoint**. It should change color to indicate that it has been selected. Click on third waypoint and **hold** on the mouse button to grab it. Now **move** the mouse to drag the waypoint to a new location. Notice the outline of the course segment from the second and third waypoints now is displayed as another color and moves as you move the mouse. Drag the third waypoint a short distance from its original location and release the mouse button. The course will change to the new location.

6.6.2.3 Inserting a Waypoint

To insert a waypoint between two existing waypoints, **click and hold** the midpoint between the two waypoints and drag it to the place you wish to insert the new waypoint. When you release the mouse button a new waypoint, course segment, and midpoint are created. Go ahead and create a new

waypoint by dragging one of the midpoints a short distance from its present location and releasing the mouse button.

6.6.2.4 Deleting a Waypoint

To delete an existing waypoint **click and hold** the waypoint to delete, then move it over an adjacent waypoint. Release the mouse button to delete it. Use this method right now to delete the waypoint you just created.

6.6.2.5 Editing a Course Using Navigation Mode

You can also edit a course with Navigation Mode used earlier to create the original course. Select the second waypoint and then click the **Navigation** toolbar button. The part of the course after the second waypoint has been deleted. Since you are now in Navigation Mode, click on a new point near Reference Point 2. A new course segment should be displayed.

Click the **Navigation** toolbar button again and this new course will be plotted. You can revise a course using this procedure from any waypoint including the current location of your unit or group. Clicking on the unit or group clears any other waypoint from being selected. When you have clicked on the unit or group you are now at waypoint 0. Waypoint 0 is constantly changing as it is the current location of the unit or group. If you click on the Navigation toolbar button while on waypoint 0, your entire course will be deleted.

BE CAREFUL WHEN USING THE NAVIGATION TOOLBAR BUTTON WITH A UNIT OR GROUP THAT ALREADY HAS A COURSE PLOTTEDM

The Navigation routine used by *Harpoon 3™* (referred to as "Navigator") ensures that the course you have drawn does not violate Nav Zones and, in the case of ships and submarines, does not traverse land. When a course is drawn that would take a unit or group through one of the above mentioned regions, the Navigator will plot a course around the area. Let's try it out. Select the Puller and then click the **Navigation** toolbar button. Any previous course plotted is now deleted. **Draw a course** directly to Reference Point 3, even though the course goes right through land to reach the destination. Now, click the **Navigation** toolbar button to plot the course.

The Navigator will begin to work on plotting the best course around the land mass. This will take a few seconds, so don't be surprised if the course is not plotted immediately. If you look carefully you should see dotted lines appear as the Navigator evaluates several courses to reach the final destination. Once the Navigator has found the optimum path, it will complete the plot. You can now edit the course manually if you wish. Go ahead and keep the course to Reference Point 3 as we move on in the lesson to learn about setting speed.

6.6.2.6 Setting Speed

Ensure that you have selected the Puller (waypoint 0) and then click the **Speed/Altitude/Depth** toolbar button. A menu will be displayed that allows you to set your speed to one of the following:

- **Stop**: Engines disengaged, speed set to zero.
- **Creep**: Engines engaged at low speed. Optimum passive sonar speed. Actual speed varies between ship and sub types.
- **Cruise**: Engines engaged at intermediate speed. Optimum fuel efficiency achieved. Actual speed varies between ship and sub types.

- **Full**: Engines engaged at high speed. Maximum speed available for sustained periods of time without suffering an engine casualty. Fuel consumption rate is greatly increased. Actual speed varies between ship and sub types.
- **Flank**: Engines engaged to maximum speed possible. Fuel consumption rate is very high at Flank. To be used in urgent or emergency conditions only. Actual speed varies between ship and sub types.

Beside the above settings, a speed can be entered in the text block provided with the Speed/Altitude/Depth menu box. Go ahead and select the Cruise setting and click on OK. You have now set the initial speed for the Puller.

6.6.2.7 Waypoint Orders

Certain orders can be preset to be executed upon reaching a waypoint. For example, we can create an order for the Puller to change speeds once it reaches the first waypoint. Let's try it. First, **select** the first waypoint. Next, click the **Speed/Altitude/Depth** toolbar button. The same menu that we used to set the Puller's initial speed will be displayed. Select **Full** and click **OK**. When the Puller reaches Waypoint 1, it will change from Cruise to Full.

6.6.3 Nav Zones

Navigation or "Nav" Zones are areas that you can designate as off limits to all or some of your units.

- A **Surface Threat Nav Zone** will exclude all surface ships from entering the zone. Aircraft and submarines are unaffected by this type of Nav Zone. You may create, modify, or delete this type of Nav Zone.
- A **Sub Threat Nav Zone** will exclude all submarines from entering the zone. Aircraft and ships are unaffected by this type of Nav Zone. You may create, modify, or delete this type of Nav Zone.
- An **Aircraft Threat Nav Zone** will exclude all aircraft from entering the zone. Submarines and ships are unaffected by this type of Nav Zone. You may create, modify, or delete this type of Nav Zone.
- A **General Exclusion Nav Zone** will exclude all units, aircraft, ships, and submarines, from entering the zone. You may create, modify, or delete this type of Nav Zone.
- **Neutral Nav Zones** are similar to a General Exclusion Nav Zone, a Neutral Nav Zone will exclude all units, aircraft, ships, and submarines, from entering the zone. You may NOT create, modify or delete a Neutral Nav Zone. Most Neutral Nav Zones will be created when the scenario is designed and will be present from the start of the scenario.

To display the various Nav Zones, open the Map Preferences Window using the **PREF** toolbar button and select each so an "X" is displayed in the boxes. We are now going to create a Nav Zone and see what effect it has on navigation.

6.6.3.1 Creating a Nav Zone

Prior to creating a Nav Zone, make sure that you have Nav Zones set to display from the Map Preferences window. To create a Nav Zone, start by clicking the **Nav Zone** toolbar button. Your mouse cursor should change into a pencil cursor identical to the one used while in Navigation Mode.

Place the cursor at a point near Waypoint 1 and start clicking and moving the mouse around the waypoint. **Draw a box** around the waypoint with the line segments created each time you click. When you reach the point where you are ready to close the polygon you just created, click the **Nav Zone** button

again and the polygon will close automatically. A dialog box should appear with a variety of exclusion zones to choose from. Select **General Exclusion A** and click **OK**. The line segments should change into one line making up the polygon with a small circle at the point where you first clicked to begin drawing the polygon. This circle is used to select the polygon to edit or delete it.

REFER TO SECTION 24MO FOR MORE INFORMATIONM

6.6.3.2 Editing a Nav Zone

Select the circle. Note that when selected, the individual points you used to create the polygon appear. These polygon nodes can be moved and deleted exactly like the navigation waypoints. We will cover deleting a Nav Zone after we have used this particular Nav Zone to demonstrate navigation around and through it.

6.6.3.3 Navigating Around Nav Zones

Now that we have a Ship Exclusion Nav Zone around Waypoint 1, let's try to navigate through it. Select the **Puller** again, click the **Navigation** toolbar button, and **draw a course** through the Nav Zone you just created. The Navigator will plot a course around the Nav Zone in a manner similar to the way the course was plotted around land to Reference Point 3 in the earlier example.

6.6.3.4 Navigating Through Nav Zones

You may require that a unit ignore a Nav Zone because it is critical for the successful completion of the mission to get to a spot inside. To navigate through the Zone, start by selecting the **unit** or **group** that you want to navigate through the zone. Next, double-click the **Nav Zone** toolbar button. The menu used to designate Nav Zone types will be displayed with each type of Nav Zone that the selected unit or group currently respects. In our case, click the **General Exclusion A** box to **clear it** and then click **OK**. The selected unit will now ignore any Nav Zone that has this type. If the polygon has other types selected, the unit may avoid for those reasons. It is important to check and see if a Nav Zone has multiple types before attempting to navigate through with the ignore feature. Try it out. Plot a new course through the Nav Zone you created earlier. The Navigator will now plot a course through this type of Nav Zone. To restore the original settings for the selected unit, simply repeat the process and place an "X" in the box as it was before.

6.6.3.5 Deleting a Nav Zone

To delete a Nav Zone, select the **Nav Zone** you wish to delete and then double-click the **Nav Zone** toolbar button. The Nav Zone type menu will be displayed again; click the "X" representing the selected Nav Zone type to remove it; this will delete the selected Nav Zone. Go ahead and delete the Nav Zone you created earlier.

6.6.4 Run the Game

Click **Settings** and **Start/Resume**. The game will now start and the Puller will begin to move on the course plotted. As the game runs, you can edit the course at anytime. Go ahead and **create** or **move a waypoint** so that Waypoint 1 is close to the Puller. Select Waypoint 1 and click the **Speed/Altitude/Depth** toolbar button. Select **Full** to give the Puller a speed change at Waypoint 1 as we did earlier in this lesson. If you want, you can speed the time compression by pressing the plus key (**+**) on the number pad portion of your keyboard. To reduce the time compression rate hit the minus key (**-**) on the number pad. Watch either the speed setting on the Unit Status Window or the unit data block as the Puller approaches Waypoint 1; when the Puller reaches it, its speed will change to Full.

6.6.5 Lesson Summary

You should now be familiar with how to draw and plot courses and assign speed settings. Go ahead and experiment with setting course and speed until you are comfortable. Once you are familiar with what you learned in this Lesson, click **Settings** and **Load BattleSet** and select **Lesson III: Using Sensors**.

6.7 Lesson III - Using Sensors

After you have selected Lesson III, select **Good Guys** as your side. To demonstrate the effective use of sensors and how the detection model in *Harpoon 3™* works, it will be necessary to change the Difficulty setting for this Tutorial scenario. Click **Difficulty** button and select **Average Difficulty Level**. Using this level will provide us with a Detection Setting of Auto Side ID which will make the sensor detection more realistic. Click **OK** to confirm the selection. Now, click **OK** on the Side Selection window to start the Tutorial scenario.

6.7.1 Passive vs. Active

You should now be looking at a display almost identical to the first two Lessons. Once again, the USS Lewis B. Puller is the lone unit for your side on the map. We will be using the Puller to become familiar with the use of sensors. Note in the Unit Status window that our sensors are currently passive which means that we are not using active sensors at this time; it also means that your passive sensors are on-line and sensitive.

An active sensor is a radar or sonar that is emitting either electric or sound energy. An active radar sends out electronic pulses which reflect off of a target and are interpreted by the radar and displayed on a screen. The same is true for active sonar which uses sound energy instead of electric energy in the pulse.

While passive sensors do not receive nearly the detailed information that active sensors do, they are quiet and therefore undetectable. The tradeoff is that, for that highly detailed information, you'll need to use active sensors and therefore will electronically broadcast your position to anyone within listening distance.

6.7.2 Composite Warfare Command Structure

Harpoon 3™ uses a command structure based upon the U.S. Navy's Composite Warfare Command. This structure divides the aspects of naval operations into several areas. For the purposes of *Harpoon 3™* we have used five of these aspects. Each Composite Commander has a particular call sign to identify them when making radio or intercom (called the "1MC" on U.S. Navy ships) broadcasts. An actual radio or 1MC call will be simulated when a contact is made by one of the following Composite Warfare Commanders:

- **Alpha Bravo (AB)** - The Senior Commander. In *Harpoon 3™*, this means you. All radio calls to AB are directed to you, the player.
- **Alpha Echo (AE)** - The Electronic Warfare Commander. Anytime an emission from a jammer is detected or lost, AB will be informed by AE. Unknown electronic or electromagnetic signals, such as jammer emissions, are referred to as "rackets".
- **Alpha Sierra (AS)** - The Anti-Surface Warfare Commander. Anytime a surface contact is made or lost, AB will be informed by AS. An unknown surface contact is referred to as a "skunk".

- **Alpha Whiskey (AW)** - The Anti-Air Warfare Commander. Anytime an air contact is made or lost, AB will be informed by AW. An unknown air contact is referred to as a "bogie."
- **Alpha X-ray (AX)** - The Anti-Submarine Warfare Commander. Anytime a sub contact is made or lost, AB will be informed by AX. An unknown sub contact is referred to as a "goblin".

6.7.3 Start the Lesson

Start the Lesson by clicking **Settings** and **Start/Resume**. The scenario will start with the Puller awaiting your orders. Plot a course to **Reference Point 1** and set your speed to **Cruise**. Following this course will provide you with several different contacts.

6.7.4 Air Contact

After a few moments, you should receive a contact report from AW alerting you to a new air contact. Notice that the contact is displayed to the north of your position. If the exact location of the contact cannot be determined, an Electronic Support Measures (ESM) track will appear as an elongated diamond with an air unit symbol inside. This represents what your passive sensors have detected. It means that the contact is emitting some kind of energy from either radar or radio communications and is strong enough to be detected by your ESM sensors.

The actual location of the air contact is somewhere inside the diamond. The area bordered by the changing diamond is an uncertainty region. Uncertainty regions appear when the contact's location is not known but there is enough information on the direction of the contact to interpolate the region where it is most likely to be located.

6.7.5 Evaluating a Contact

Click on the **aircraft symbol** and take a look at the Unit Status window. Here you will be able to view information about the contact. Since it is an unknown contact we have little information about it. Notice, for example, that there is no information about course and speed on the contact. Click the **Report** button in the Unit Status window. In the Sensor text box there is a listing of the type of emission that is coming from the air contact. Emitters that are currently emitting are marked by an asterisk symbol (*****). Since the emission is an air weather radar and a transponder set with a commercial code, there is a high probability that the contact is civilian air traffic. Depending on your tactical situation, your orders, and the number of assets you have available, you could find out more about the contact by using other sensors or by sending your aircraft to intercept and identify. Since we are a lone ship we can only use our sensors.

6.7.6 Using Active Radar

Turn on your radar by clicking the **Sensor** toolbar button. Click the **Active** selection for Radar in the **Sensor Selection** dialog window. Range circles should now be displayed around the Puller and the Unit Status window should say ACTIVE in the EMCON block. The range circles represent the maximum effective range of the sensors. These are not absolute as sensor ranges can vary due to meteorological conditions as well as factors relating to the position and size of the contact. The yellow circle represents the surface search radar and the white circle (which is only visible as a large arc) is the air search radar.

6.7.7 Radar Contacts

You should now have a better fix on the first air contact while also detecting a second air contact. You should now have two air contacts. If you click on either of these contacts you will see that you can

now see information about their speed and course. The reason we did not detect this second contact is because the aircraft was not radiating energy from radar or radio. Confirm this by clicking on the **new air contact** and selecting the **Report** button in the Unit Status window. There is no type of sensor listed which means the contact is not emitting. Since we have no ESM information coming from the new contact, it is truly an unknown. For the purposes of this lesson we are going to allow the air contact to approach our ship to demonstrate visual identification.

Let the air contact approach and watch what happens. It should head straight for the Puller. The first air contact is moving more to the east away from your location. Notice that as it moves past, the contact will switch between being displayed as a solid contact and as an uncertain ESM track. This happens more frequently with contacts moving near the maximum range of the detecting platform. You may also temporarily lose the contact only to have it reacquired and reported as a new contact. Pay particular attention when this happens so you don't incorrectly assume that another aircraft has been detected. As the first air contact moves to the east, the accuracy of the contact will diminish and will eventually be lost. Since the first air contact is moving away from our location it is not a concern. The second air contact is, however, beginning to turn towards our location. Although this would normally be the cause for some concern on our part, we will allow the contact to get closer.

6.7.8 Visual Identification

Once the second air contact is in visual range (which varies depending on weather, time of day, size of contact, and the altitude of the contact) you will receive a message indicating that we have identified the it. Notice that ID information is now provided in the Unit Status Window. We can see the contact is a civilian airliner taking a big chance by not having its transponder or radar turned on! Since it is not a threat, we will allow it to pass. In real life that pilot would have received a stern radio warning or would have been intercepted by fighters or even shot down if the tactical situation was tense. We will allow the contact to pass and continue. Leave the radar active for now.

6.7.9 Sonar

As we continue on our course we will now learn more about the sonar. Your passive sonar is always on. The capability of your passive sonar to detect is reduced as the ship's speed is increased. Let's decrease our speed by clicking **Speed/Altitude/Depth** toolbar button and selecting **Creep** as our new speed. Notice that the passive sonar range circle increases once the Puller has slowed. This increase in passive sonar range is due to the reduction in noise that results from the ship moving slower through the water. After a while, you should detect an unknown submerged contact (probably a submarine) somewhere below and along your course.

6.7.10 Sub Surface Contacts

Unlike ships and aircraft, it is unlikely that you will ever visually ID a submarine contact. Sub contacts are very difficult to pinpoint. There is always the strong possibility that you will lose contact with a submarine. The location, speed, aspect to your platform, and a variety of other factors, will determine the accuracy of your submarine detection. Submarines will often make aspect changes to foil any attempt follow them from behind. This tactic can also make it more difficult to maintain a solid passive contact on the submarine.

6.7.11 Working the Contact

Let's do a little bit of aspect changing ourselves. Go ahead and make a few minor changes to the Puller's course so the ship zig-zags across its original course. Do this by making several 45 degree turns back and forth. See if the contact changes as you make the turns. For this example the submarine is making turns as well, so you should see some changes.

6.7.12 Active Sonar

After watching the contact for a short while, go ahead and turn on the active sonar. Do this by clicking the **Sensor** toolbar button and selecting **Active Sonar**. Notice that the sonar range changes colors to indicate that the sonar is now active. The big drawback to using active sonar is that you are now sending sound pulses through the water that can be traced back to your location. Active sonar announces to everyone where you are located. Depending on the location of the sub contact when you go active, there may be changes in the quality of the contact. Observe the contact for a few moments and then **turn off** the active sonar.

6.7.13 Resume Course and Speed

The submarine used in this lesson was neutral and not a threat. We will let it pass, noting that the quality of the contact degrades as we move further away. Notice that the size of the uncertainty region surrounding the sub contact increases as we get further away. Let's continue on our original course to Reference Point 1. Go ahead and increase speed to **Cruise**.

6.7.14 Surface Contacts

After continuing on the course towards Reference Point 1, you should soon detect a surface contact. Notice that the contact is an ESM detection which means that the Puller is detecting some kind of energy radiating from the contact. Select **the contact** and click **Report** in the Unit Status Window. The sensor list shows several types of radar common to British naval vessels. The contact is not in radar range yet so we will wait a bit and see if the detection improves as we get closer. Eventually the contact will solidify and you will be able to determine the contact's exact location. Once this happens, the contact will change to a brighter color indicating a solid contact.

6.7.15 ESM vs. Active Radar Detection

Once you have a solid contact, turn off your radar and watch what happens to the contact. It went back to being an ESM track. Now turn the radar back on and watch the contact solidify again.

6.7.16 Identification

As the contact gets closer there is a chance that we will make a visual identification. If we wanted, we could also send up a helicopter to identify the contact. We will cover the capabilities of on-board helicopter use in another lesson. At this range the contact has detected us as well. If it were an enemy ship there is a good chance we would have several missile contacts as well. Once the surface contact is in visual range it will be identified as H.M.S. Exeter, a British Navy destroyer.

6.7.17 ECM

At a point close to where Puller and Exeter pass each other, Exeter will turn on her Electronic Counter-Measures (ECM). Turning on the jammers can affect radar and communications. Note that when the jammer is turned on, a small "Q" will appear in the upper right corner of the unit symbol representing Exeter, and a small "X" will appear in the upper right corner of Puller. These markings designate the Exeter as the jamming source and that Puller is having her sensors degraded due to jamming. After a short while Exeter will shut off her jammer. Once this happens, go ahead and try out Puller's ECM gear by clicking the **Sensor** toolbar button and selecting **ECM Active**. Note the "X" marking on Puller. You will not have information about other ships being jammed unless they are in communications with you. There is an "X" on Puller because your own jammers are affecting your sensors. Go ahead and **turn the jammers off** for now.

6.7.18 Comm Link

The only selection in the Sensor Selection box that we have not used is Comm Link. This is used to establish and maintain communications between units on your side. We will cover this in detail in an upcoming lesson.

6.7.19 Remainder of the Lesson

The remainder of Lesson III takes place as the Puller turns east and traverses between Reference Points 1 and 2. You should make contact with another submarine and one more surface vessel. Go ahead and explore the remainder of this scenario by working these two contacts.

6.7.20 Change the Detection Setting

To properly demonstrate how to work sensor contacts you should try running this scenario again with a more difficult Detection Setting. This time, select a Difficulty of **Custom**. Go ahead and give it a try. Reload the Lesson III tutorial scenario and set the Detection Setting to **Full Reality** using the Custom difficulty setting button. Running at Full Reality will provide you with less information about the contacts once they are detected. This will make it more difficult to positively identify contacts. When you have fully explored the scenario at Full Reality you can go back and try each of the various detection settings. When you are ready to move to the next lesson go ahead and open the **Tutorial BattleSet** again to load **Lesson IV: Using Weapons**. Finally! You get to shoot at something!

6.8 Lesson IV - Using Weapons

Select **Lesson IV: Using Weapons** from the Scenario Selection window. It is recommended you set your Difficulty Level to **Average** for this lesson. Select **Good Guys** from the Side Selection window.

6.8.1 Starting the Lesson

Once again, you are in command of the USS Lewis B. Puller. As with the other two previous scenarios, you will be navigating from the present position of the Puller to Reference Points 1 & 2. Go ahead and set your course to the two Reference Points as you did in the previous lessons. Set your speed to **Cruise** and leave your sensors **turned off** for the time being. Note that for this lesson scenario, some new range circles are shown around the Puller; these are the ranges for Anti-Surface, Anti-Air, and Anti-Submarine weapons. These circles represent the maximum range of the weapon in each category. Go ahead and start the scenario lesson by clicking **Settings** and **Start/Resume**.

6.8.2 Weapons Free or Weapons Tight

There is an option in the Game Preferences dialog window under the Settings menu that determines whether or not your units will fire on enemy air targets independently. **Weapons Free** allows units under your command to engage independently and **Weapons Tight** prevents units under your command from firing without orders from you. The default setting on *Harpoon 3™* is Weapons Free. When Weapons Tight is selected it will be up to you, the user, to engage incoming air and missile targets. It is important to note that Weapons Tight is only respected by units that are unassigned or on plotted missions. Units on other missions or out of comm range will always behave as if the Weapons Free option is selected. For the purpose of this lesson leave the setting as Weapons Free.

6.8.3 Air Threats

Shortly into the scenario you should have two air contacts to the north. Go ahead and watch these contacts for a few minutes to see if you can determine more information about them without turning

your sensors on and revealing your position. Click on **each contact** and determine what kind of emissions your ESM gear has detected. The contacts are emitting surface search radar that can be found on several Soviet made heavy bombers. So, it is a logical assumption (for this scenario, at least) that these are the Bad Guys. Let's watch them for a while and see where they are headed.

6.8.4 Acquire Air Targets

After observing these contacts for a few minutes, we can see they are headed for our position. It looks like we may have a fight on our hands. In most scenarios you would probably have additional assets such as fighter aircraft to intercept a possible threat. We are going it alone in this scenario to demonstrate the use of surface-to-air weapons. Go ahead and **activate your radar** (you should know how to do this from our last lesson). You should quickly obtain solid contacts on both aircraft. The next portion of the Tutorial will demonstrate the difference between automatic and manual engagements.

6.8.4.1 Automatic Engagements

Since we have set the Staff Preference option to Weapons Free, allow the first aircraft to get close enough for a visual ID to see if the Puller will engage the air threat on her own. The first aircraft is identified as a Bear-F Bomber (ASW variant). Once it has been identified, the Puller will automatically engage. You should see a video of a missile launch and if you have a PC with a sound card, the sound of the missile launch will be heard as well. A missile symbol will appear and begin tracking towards the target. If it hits you will notice a rosette pattern representing an explosion surround the aircraft hit by a missile; If it misses, additional missiles will be automatically launched.

6.8.4.2 Manual Engagements

We are going to engage the second air target manually. First, click **Settings**, **Game Preferences**, and **Weapons Tight**. Then, click the **Attack** toolbar button. Your cursor should now be a targeting crosshair. Once the second air threat has crossed the range circle for your air weapons, **double-click on the aircraft symbol**. A window will be displayed with four panels.

The upper-left is the firing unit, the upper-right is the list of available weapons listed in the order of most capable weapon for the designated target. The lower-left panel lists the target(s) and the lower-right lists the weapons allocated for the target(s) listed. This is the Weapons Allocation dialog window. As you can see, one SM-1 missile has been allocated to engage the target. Let's fire three missiles by **clicking twice on the listing for the SM-1** in the upper-right panel. The number of SM-1 missiles allocated should now be three. On second thought, let's only fire two missiles and save some of the taxpayer's money. **Click once on the listing of three missiles** in the lower-right panel. The number of missiles should now read two. Then, click **OK**. The missiles should now launch with a display identical to the automatic sequence used to engage the first threat aircraft. In the unlikely event that both of your missiles should miss, fire again. By the time the second aircraft is destroyed you should pick up a third incoming air contact.

6.8.4.3 Manual Engagements with Groups

We are going to engage the last air threat as a group. Although it doesn't seem so, the third incoming air threat is actually a group of two aircraft. Make sure that the Puller is **selected**. When the aircraft come within range, click the **Attack** toolbar button and then **drag-select** the incoming air group. Once again the Weapon Allocation dialog window will be displayed, but you will notice that this time there are two Bears listed in the enemy unit section of the screen. You will see that the staff has already allocated an SM-1 to each. Go ahead and click **OK**. The missiles should now launch and each of the allocated missiles will track its assigned target. In the unlikely event that both of your missiles should miss, fire again.

DRAGBSELECTING CAN BE USED TO SELECT REFERENCE POINTSL FRIENDLY UNITSL AND ENEMY UNITSM ONE KEY FUNCTION OF DRAGBSELECTING IS IN FORMING GROUPSM TO DO SOL SIMPLY DRAGBSELECT THE UNITS YOU WISH TO GROUP AND PRESS THE WGW HOT KEYM TO GROUP FRIENDLY AIRBORNE UNITSL THE UNITS MUST BE THE SAME TYPE OF AIRCRAFTL HAVE IDENTICAL LOADOUT TYPESL AND BE ON THE SAME MISSIONM

6.8.5 Staff Allocation

Each time you attack a target your staff will automatically allocate a number of appropriate weapons unless you do not have **Allocate Weapons** selected (click **Settings**, **Game Preferences**, and **Staff Preferences** to view this). Even if you have the staff allocate weapons, you can still manually edit the allocation by clicking on the various selections in each panel on the Weapons Allocation box.

6.8.6 Surface Threats

With the air threat eliminated, let's continue on course for Reference Points 1 & 2. Leave your radar **on**. As we near Reference Point 1 we should be detecting two surface contacts. Once there is a surface detection, go ahead and continue to close on the contacts to make a visual ID. In the meantime, evaluate the contacts by selecting each and clicking the **Report** button to determine what type of radar each one is emitting. We can see that the first contact is radiating a Square Tie Surface Search (SS) radar and a Drum Tilt acquisition radar, both are common to Soviet missile boats. The second contact has a generic navigation radar. Looks like a cargo ship being escorted by a missile boat. Let's take 'em both out.

Once the first contact is in range of your surface weapons (outer weapons range circle), select the Puller and click the **Attack** toolbar button. The cursor should change to a targeting crosshair. Either **double-click** on the first surface contact or **drag-select** it. The Weapons Allocation Window will be displayed as it did when we were targeting air targets earlier in this Lesson. This time the target is a surface contact and the weapons are surface-to-surface missiles and guns. Because the Staff Allocation feature is turned on in Staff Preferences, a Harpoon missile has already been allocated for the target. Double-click on the allocated Harpoon missile to remove it from the allocation list. Instead, select the Standard Anti-Radiation Missile (ARM) by double-clicking it in the Weapons Available list.

6.8.7 Anti-Radiation Missiles

Anti-Radiation Missiles (ARMs) are weapons that guide on radiated energy and are used to destroy an enemy's radar system. An ARM will lock on to the signal radiating from an enemy radar or jammer and fly directly to that source. ARMs can be launched from surface ships and from aircraft. Click **OK** after allocating **one ARM** to be targeted on the first surface contact. Another dialog window will be displayed listing the number of ARMs allocated and the various types of emitters currently detected that are radiating from the target. You can then allocate each individual **ARM salvo** to one particular emitter. Essentially, each plane can only attack one emitter with any single Attack action. Click **OK** to confirm the selection that has already been made by your staff.

Video and audio representations of a missile launching will play and a missile symbol will appear on the map screen heading toward the target. If the missile is shot down or misses the target, fire another. Go ahead and **target the first surface contact** with a Harpoon missile to finish it off. After it has been hit, click the **unit symbol** for the first contact and note that in the Unit Status window the unit is on fire and sinking.

6.8.8 Bearing Only Attacks (BOL)

Some weapons can be launched without designating a target. Bearing Only Attacks allow the player to designate a point on the map where the weapon's targeting sensors will activate and begin searching for a target. This can be useful if you have lost a contact but have a good idea where it is located and want to launch an attack even though you do not have a fix on it. To launch a Bearing Only Attack, use the Bearing Only Attack hot key. The cursor will change to a pointer finger cursor. Move the cursor to the point you want the weapon's seeker to activate. Click **once** with the mouse button to designate the activation point. The Weapons Allocation window will be displayed with a list of Bearing-Only capable weapons. **Allocate** and **launch** in the same manner as before. Go ahead and **launch a Harpoon** in the general direction of the second surface contact designating an activation point just in front of the contact. The missile will launch, proceed to the activation point, and then activate its search radar to acquire a target. The missile should hit if the weapon's sensor locks-on to the target.

6.8.9 Naval Gunfire

Naval Gunfire does not have the range of surface-to-surface (SSM) or surface-to-air (SAM) missile; you have to get in closer to use guns. Go ahead and **close** with the second surface contact. Click the **Attack** toolbar button and allocate several gun bursts from several of the available guns. Each allocation of a gun is a burst that fires several rounds. The number of rounds per burst varies with each weapon. Click **OK** to fire. It will take many shots to sink the ship. Once it is damaged and burning, go ahead and proceed on the original course towards Reference Points 1 and 2.

NAVAL GUNFIRE WILL NOT SHOW UP ON THE TACTICAL DISPLAYSH INSTEADL ONLY A MESSAGE THAT THE UNIT IS ENGAGED WILL DISPLAYM

6.8.10 Continue on Course

After the Puller passes Reference Point 1 and changes its heading for Reference Point 2, you should detect another surface contact. This contact is going to be more of a challenge; it is an enemy missile boat loaded with several missiles. We are going to engage it to demonstrate how missile air defense works. However, even though this is a tutorial, there is a chance that the Puller could get hit or possibly destroyed, which would end the scenario. This would, therefore, be a great time to discuss the Save Game feature. If for some reason the enemy gets lucky and destroys the Puller, you can return to this point in the Lesson without having to repeat the first two engagements.

6.8.11 Saving a Game

Click **File** and **Save As**. A dialog window will be displayed where you can enter the name to be used for the saved game. Save the game as **LESSON4A.SAV**. Once it is saved, you can load the saved game by clicking **File**, **Open**, and selecting **LESSON4A.SAV**.

6.8.12 Air Defense Against Missiles

We have a saved game available, so we're safe for now – let's press on into battle. Continue on course to close the distance between the Puller and the enemy contact. When the contact is in range of your surface-to-surface weapons, fire away!

It is likely that as soon as you fire, the contact will launch missiles at your missiles and at you directly. Watch what happens as both sides defend against inbound missiles. Several of the missiles will be shot down, resulting in a video of an air target being hit and the symbol for the missile disappearing from the map. Since Weapons Free is currently selected in Staff Preferences, the Puller has been defending itself without your intervention. This does not preclude you from targeting an inbound mis-

sile manually. To do so, treat the inbound missile in the same manner as you did when you targeted and launched on the incoming Bear-F aircraft. Go ahead and try to engage manually if you wish. If the Puller is sunk, or even if it isn't and you want more practice, reload the game you previously saved and try again until you are comfortable with how to engage missiles. This is also a good opportunity for you to have some fun by getting into a shooting match with the enemy missile boat. When you have had enough, continue with the rest of the Lesson.

6.8.13 Active & Passive Counter-Measures

6.8.13.1 Close-in Weapons System (CIWS)

Many ships are equipped with a Close-in Weapons System (CIWS) that is used as a last resort. CIWS is a rapid-fire Gatling gun that engages inbound missiles at close range. This defensive system is automatic if set in the database.

6.8.13.2 Naval Guns

Some naval guns may also be used to engage an incoming missile threat. In *Harpoon 3™*, this type of point defense is conducted automatically.

6.8.13.3 Chaff

Chaff is a cloud of radar-reflective material that is fired from ships and airplanes to confuse enemy radar. The most common use of chaff is to decoy inbound missiles. The launching of chaff is conducted automatically.

6.8.13.4 Flares

Flares are very hot incendiary devices that are fired from ships or aircraft to decoy heat seeking missiles. Flares are used and depicted in the same manner as chaff.

6.8.13.5 Jamming

Some ships and aircraft have the ability to jam enemy radar by transmitting powerful signals that interfere with enemy radar. To turn on jammers, click the **Sensor** toolbar button and select **Active** for the Electronic Counter-Measures (ECM) selection.

6.8.13.6 Blip Enhancers

Some helicopters are equipped with blip enhancers. This is an electronic device the sends out a strong signal that makes the helicopter look like a large, inviting target, thereby luring the missiles away from real large, inviting targets. To use a blip enhancer a helicopter must be flying near the ship that is targeted by enemy missiles. Click the **Sensor** toolbar button and select **Active** for ECM to activate blip enhancers.

6.8.14 About Submarine Threats

Now that we have engaged air, surface, and missile contacts, let's discuss submarine threats. As we noted in Lesson III, submarines are very elusive. The range of the Puller's Anti-Submarine Warfare (ASW) weapons system (the MK-46 torpedo) is not that impressive. In order to utilize it, the Pullman would have to get close to the submarine, which is not a sound tactical move. Normally, the submarine will prevail in such a case.

In this situation, ASW helicopters should be launched from the Puller's flight deck to prosecute a sub contact. We will cover this aspect of ASW in the Air Ops Tutorial Lesson. Engaging a sub contact with surface-launched torpedoes uses the same targeting and weapons allocation procedure as we used to engage air or surface targets with missiles. If you should find yourself in the position where you are on top of an enemy sub it would be best to launch a couple of torpedoes and leave the area as quickly as possible.

6.8.15 Run at Full Reality

For a greater challenge, try running this lesson again with the Detection Setting at Full Reality. You will notice that it is more of a challenge when the enemy is more difficult to identify. While you already know what will happen in this scenario, running it at Full Reality will make you appreciate the efforts required to identify contacts before engaging.

It's important to realize that when in full reality mode, a number of things are going to happen:

1. You will lose control of his subs (radio signals cannot go thru water) and submarine signaling is not possible. Normally you should plot the sub's course or put it on a mission and then set its depth. At that point the sub will dive and you will not be able to control it as contact will be lost. Once the sub has completed it's navigation path or mission, it will then come to periscope depth and you will regain contact (and control) of that sub. It is, in effect, asking for instructions when it has completed whatever you wanted it to do.

2. Units have a comm range that is specified at the bottom of the unit status window. There's two values; **Active** and **Passive**, with values displayed next to them. That value is the range in nautical miles of the platforms communications devices. Once a platform goes beyond that range, the user will lose contact (and control) over that platform. This especially applies to aircraft on missions.

In real life, you'd have a series of links set up to communicate to and from the flagship. For example, a link from a carrier to the E-2 and on to the F-14 for example. Because of this link, it is possible that the F-14 may not be able to contact the carrier on its own.

6.8.16 End of Lesson

Let's move on to the other side of the equation and learn about submarine warfare from the point-of-view of the submarine commander. Load **Lesson V: Submarine Operations**.

6.9 Lesson V - Submarine Operations

For best results, set your Difficulty Setting to Average for this tutorial scenario.

6.9.1 Getting Started

In this lesson we will leave the USS Lewis B. Puller and take command of the USS La Jolla, a Los Angeles-class fast attack submarine. We will examine some of the unique characteristics of submarine operations. Once you have loaded Lesson V, select **Good Guys** again. The Lesson V tactical map is identical to the previous lessons, except that instead of the Puller, the La Jolla is present.

6.9.2 Navigation

Select the La Jolla and plot a course to Reference Points 1 and 2. Navigation for submarines is identical to the procedures used for surface ships. The major difference is that submarines can change

depth. The Speed/Altitude/Depth toolbar button is used to set a submarine's speed and depth at which it will operate. Go ahead and set the La Jolla's speed to **Creep** and her depth to **Intermediate**.

6.9.3 Using Sensors

The primary sensor for a submarine is its passive sonar. You can see the passive sonar range circle for the La Jolla on the map display. Although submarines also have an active sonar capability, using active sonar will reveal the sub's presence and the element of surprise will be lost. The passive sonar is always functioning; therefore, it does not need to be turned on. Continue on course with passive sonar only. You can increase the time compression to **5 minutes**. As soon as you detect a surface contact reduce your time compression to **1 second**.

6.9.4 Surface Contacts

The quality of the contact will depend on several factors, including the speed, size, and aspect of the contact. Your speed and depth, as well as the location of the thermocline, all affect the quality of a sonar contact. Try changing your depth and course if you need to improve the contact. Since the contact is very large, it has been identified as the Alligator, a cargo vessel for the Bad Guys. It is very unlikely that it is traveling unescorted, which means there is probably another ship in the area we have not detected yet. The second contact should be made shortly after the first and will be a Nanuchka-class missile boat. Fortunately for the La Jolla, neither of the contacts has any ASW weapons.

6.9.5 Sub Contacts

It has been said that the best way to hunt a submarine is with another submarine. Shortly after detecting the two surface contacts, a submarine contact will be detected to the northeast of the La Jolla's position. We now have two surface contacts that are lucrative targets while a sub threat exists nearby. Let's take out the two surface contacts and then deal with the sub.

6.9.6 Using Weapons

Escort or not, we are going to attack the Alligator first. With the La Jolla selected, click the **Attack** toolbar button, allocate **two Mark 48 ADCAP torpedoes**, and click **OK**. You will see two torpedo symbols appear and move toward the Alligator. Normally, we would immediately change course and depth to evade any counterattacks. However, let's demonstrate the use of missiles from submarines by attacking the Nanuchka class escort. The procedure for launching a missile from a submarine is identical to that used with ships with one important exception: the submarine must be at Shallow depth or above when launching. Go ahead and change the La Jolla's depth to **Shallow** by clicking the **Speed/Altitude/Depth** toolbar button. It will take a minute or two for the sub to change depth. Additionally, because the torpedo tubes on the La Jolla were all loaded with ADCAPS, we must load the missile manually.

Once the sub reaches Shallow depth, double-click on the **Logistics** toolbar button. In the Reload Weapon Selection dialog window you will see three panels: **Mount List**, **Mount Weapons**, and **Magazine Weapons**.

The Mount List displays the available mounts on the selected unit and whether or not they are currently loaded. The numbers next to a mount (in this case "1/1") indicate both the number of rounds it contains and the number it can hold when full.

The Mount Weapons panel shows all the possible weapons that can be loaded into the selected mount and which ones currently are loaded there. The Magazine Weapons panel displays all the remaining unallocated ordnance on the selected platform. In the Mount List, **select one of the full**

torpedo tubes. It should be designated as 533 mm MK68TT x 1/1. In the Mount Weapons list, find and **double click on one of the MK48 ADCAP 1/1 torpedoes**. Notice the 1/1 becomes 0/1 and the selected tube in the Mount List also changes from 1/1 to 0/1. This designates that the torpedo tube mount is now empty.

To load the mount, double-click on **Harpoon ID x 6/8** in the Magazine Weapons panel. Notice it decreases to 5/8, the Harpoon ID in the Mount Weapons list changes to 1/1, and the selected torpedo mount in the Mount List changes to 1/1. Click **OK**. Loading mounts takes a certain amount of time, so allow several minutes to pass (game minutes, that is). Once finished, attack the Nanuchka by clicking the **Attack** toolbar button, double clicking **on the Nanuchka**, and allocating a **RGM-84D Harpoon ID**. After clicking **OK**, you will see a missile symbol appear. The missile will fly to the target and if it hits, the hit video will display. If it misses, reload the other mounts with Harpoons or attack the Nanuchka with ADCAPS. Now it is time to deal with the sub contact.

6.9.7 Using the Thermocline

The temperature of water creates layers in the ocean that affect the propagation of sound. These layers, called the "Thermocline" or simply "the layer," are used by submarine commanders the world over to help them avoid detection.

IN HARPOON 3™ L THE LAYER IS LOCATED BETWEEN THE SHALLOW AND INTERMEB DIATE DEPTH BANDSM

Being above or below the layer offers a submarine the ability to minimize detection depending upon the location of enemy subs. You may have to change the La Jolla's depth several times to get the best detection and attempt to determine the enemy submarine contact's depth. Remember, the contact may have detected you as well. Changing your course and depth is a wise tactical procedure. Go ahead and alter both **course** and **depth** from time to time as you close with the sub contact. However, note that the thermocline diminishes during winter months. Temperature changes in the ocean can make the layer disappear. Without a layer, hiding isn't much of an option; instead, moving away as fast as possible is your best bet.

6.9.8 Closing with the Sub Contact

For now, let's set the La Jolla's depth to **Intermediate** and plot a course toward the submarine contact. As the La Jolla gets closer to the contact, we should have enough of a quality detection on it to identify the class of submarine. This contact is an Akula-class attack submarine.

6.9.9 Engaging the Sub Contact

Attempt to maneuver behind the Akula. You may need to alter speed to catch it in the correct position. Once you are behind it, close to within two or three miles. Once in position, **attack** the Akula with a **MK-48 ADCAP torpedo**.

6.9.10 End of Lesson

Feel free to reload the lesson if the La Jolla gets sunk. Learning from mistakes is the best way to learn the ropes. When you are ready, go ahead and end the scenario and load **Lesson VI: Air Operations**.

6.10 Lesson VI - Air Operations

Set your Difficulty Setting to **Average** for this Tutorial Lesson. We will concentrate our attention on the use of aviation assets. Once the Lesson VI tutorial scenario has been loaded select, as always, to play the **Good Guys**. Examine the map and note that we have one airbase labeled "Good Guys 1" located on the northern half of the map. On station to the northwest of the base is the aircraft carrier USS Theodore Roosevelt. A known enemy installation, a fuel depot, is located just south of Good Guys 1. Just north of the base two aircraft are circling. One is a KC-135 Stratotanker and the other is an F-16 Fighting Falcon. There are also two Reference Points that will be used during the lesson.

6.10.1 Launch Aircraft

Let's get a better idea of what our situation is by launching an E-3 Airborne Warning and Control (AWACS) aircraft. Select the **Good Guy 1 airbase**, then click **Window** and **Order of Battle**. The report will provide a listing of what aircraft are currently assigned to the base. You will see there are only one E-3 Sentry and four F-16 Fighting Falcons available. There are three ways to launch an aircraft from a base or ship:

- **Formation Air Patrol** – Using the Formation Editor
- **Air Mission** – Using the Mission Editor
- **Manual Launch** – Using the Launch/Ready Aircraft Window

We will be using the Manual Launch method to get the E-3 airborne. **Close** the Order of Battle window and then click the **Air Ops** toolbar button. A Launch/Ready Aircraft window will be displayed, listing the E-3 as well as its loadout, status, and mission assignment.

Below the aircraft listing is an inventory of the highlighted aircraft's loadout. Click on the **E-3 Sentry** and press the **Launch** button at the bottom of the screen. A small window will be displayed asking how many aircraft you desire to launch; click **OK** to approve the one already selected. Notice that listing for the E-3 now includes "O/T Launch" which stands for "Ordered To Launch." If you change your mind and do not want the aircraft to launch, click the **Clear** button to remove the launch order for that aircraft. However, we want to launch the E-3, so click **Continue** to execute the launch order. The window will close and after about two to three minutes the E-3 Sentry will launch and begin circling near the airbase, awaiting your orders.

Select the **E-3** and click the **Navigation** toolbar button. Plot a course to **Reference Point 1**, set the E-3's speed to **Cruise**, and the altitude to **High**. A higher altitude will improve radar range. After the aircraft begins to head towards Reference Point 1, **turn on** the radar. You should immediately detect an airborne contact and a surface contact.

6.10.2 Ready Aircraft

Aircraft can be configured to carry a variety of different weapons, fuel tanks, and jamming pods. Collectively these components are called "stores." The type of mission the aircraft will perform dictates the particular loadout it will use.

Loadouts will differ between aircraft as each aircraft has its own capacity and endurance range. Let's demonstrate how to ready aircraft by selecting the **Good Guy 1 airbase** and clicking the **Air Ops** toolbar button. As before, the Launch/Ready Aircraft window is displayed; select **one of the F-16s** and click **Ready**. The top portion of the window will now display a list of available loadouts for the F-16. Click on several to view the contents of each loadout in the lower portion of the window.

For this first F-16, select a **PGM** (Precision Guided Munition) loadout and click **OK**. The list of loadouts will change to the list of aircraft. Note that one of the F-16s is now listed with a PGM loadout and will be ready in 30 minutes. Go ahead and ready **each of the four F-16s** with different loadouts of your choice. When aircraft are ready a message will appear in the Incoming Message window and, if selected, a Staff Message window. The procedure we used to ready aircraft for the airbase is identical to readying aircraft on a carrier or a ship with helicopter facilities.

6.10.3 Anti-Ship Strikes

Now that the E-3 is providing us with a better picture of our situation, let's take a closer look at the surface contact. Select the **USS Roosevelt** and click the **Air Ops** toolbar button to view the Launch/Ready Aircraft window. The "Teddy R" has one F/A-18 Hornet with a Standoff loadout (SO), another F/A-18 Hornet with an Iron Bomb (IB) loadout, an F-14 Tomcat with an Air-to-Air loadout (ATA), and an SH-60B Seahawk helicopter with an Anti-Submarine loadout (ASW). Select the **F/A-18** with the Standoff Loadout, which we can see in the loadout listing below includes two AGM-84D Harpoon missiles. Click **Launch** and **OK** to confirm.

Now we will learn how to use the Airborne Intercept Routine. Once the Hornet is airborne, **select it** and click the **Air Ops** toolbar button. The mouse cursor will turn into a targeting crosshair. Double-click on the **surface contact**; doing this will order the F/A-18 Hornet to intercept it. When ordered to intercept the contact, the Hornet will set its own course, speed, and altitude toward the surface contact. If the contact is determined to be hostile, the Hornet will engage the target. As we will soon see, the surface contact is our old friend the Kriminsky Komsomolets. When the Hornet is in range it will launch one or both Harpoon missiles at the ship and either return to base or launch another missile depending on the result of the first launch.

Now let's focus our attention on the enemy fuel depot.

6.10.4 Air-to-Ground Strikes

As we did with the first F/A-18 Hornet, launch the second F/A-18 Hornet (with the IB loadout) from the Roosevelt. The Hornet's iron bomb loadout should be quite effective against the fuel depot. You can select to have

the Hornet intercept the fuel depot; alternatively, you can plot a course for the F/A-18 to the depot and when it is directly over it, click the **Attack** toolbar button and allocate your load of iron bombs against the fuel depot. When you have expended bombs on this target, let's move on to the air contact.

6.10.5 Air-to-Air Engagements

We still have to deal with the airborne contact. Select the **USS Roosevelt** again and launch the **F-14 Tomcat** to intercept the air contact. When the F-14 is in range of the contact it will launch an AIM-54 Phoenix missile at it. The contact in this lesson scenario is a TU-16 Badger bomber. If your missile misses, launch again or close with the target and engage with guns by clicking the **Attack** toolbar button and allocating **bursts** from the 20 mm cannon. You must be in very close to the target to engage with guns. When the target is destroyed the F-14 will remain on station loitering until it is low on fuel ("BINGO FUEL" in pilot terms), at which time it will return to base.

6.10.6 Airborne ASW

There is a submarine in the vicinity of Reference Point 2. Select the **USS Roosevelt** and launch the **SH-60 Seahawk** helicopter. Once it is airborne, plot a course for **Reference Point 2**. Plot the course so that the SH-60 passes back and forth over Reference Point 2.

To locate the sub we will drop several sonobuoys. When the Seahawk reaches the area around the Reference Point, hit the one of the Sonobuoy Release hot keys on your keyboard.

There are two types sonobuoys: Passive and Active. A Passive sonobuoy listens for sounds in the water while an Active sonobuoy sends out a sonar ping and listens for the return of the sound to determine if there is a submarine in the area. When you drop a Passive sonobuoy it will be in communication with the aircraft that dropped it, providing constant contact information.

An Active sonobuoy has a passive capability identical to the Passive sonobuoy but can be turned on to send out pulses of sound energy to detect submarines. To turn on an Active sonobuoy, first **select the sonobuoy** and click the **Sensor** toolbar button. Drop several of each type of sonobuoys and wait to see if they detect the sub. When the sub is detected, engage it by selecting the **SH-60**, clicking the **Attack** toolbar button, and clicking on the **sub contact**. Allocate a **torpedo** and click **OK**. The torpedo will deploy and begin to search for the submarine. Sub contacts can also be intercepted in a similar fashion to that used to intercept aircraft, ships, and ground targets. Play around with the sub contact for a few minutes and then let's move on to explore aerial refueling.

6.10.7 Aerial Refueling

Remember the F-16 and the KC-135 circling north of the airbase? The F-16 is probably getting low on fuel. Let's use these two aircraft to demonstrate how to conduct aerial refueling.

Select the **F-16** and click the **Air Ops** toolbar button. The mouse cursor will change to a targeting cursor; double-click on the **KC-135**. You can

also drag-select the KC-135. The F-16 will then plot an intercept course with the KC-135, which will loiter until the F-16 arrives, to begin aerial refueling. This process takes several minutes once the two aircraft join. Once the F-16 has finished refueling it will continue to loiter with the tanker until you give it orders to do something else, or it will return to the mission to which it was assigned prior to the refueling order.

6.10.8 Land Aircraft

Once you are finished with the aerial refueling, let's end this Tutorial Lesson by ordering all airborne aircraft to return to base. Select the **aircraft** you wish to order back to base and click the **Air Ops** toolbar button. The mouse cursor will change into a crosshair; click the desired **landing site**, either a base or ship.

THE BASE OR SHIP MUST BE CAPABLE OF SUPPORTING THE SELECTED AIRCRAFT! FOR EXAMPLE, YOU CANNOT LAND A FIGHTER JET ON A FRIGATE, OR A LAND-BASED AIRCRAFT LIKE THE E-3 ON AN AIRCRAFT CARRIER.

Go ahead and order any of the other aircraft used in this lesson to land. This completes Lesson VI. Our next lesson deals with creating & editing missions.

6.11 Lesson VII - Using the Mission Editor

Load **Lesson VII** from the Scenario selection screen and select **Good Guys** as your side. Set the Difficulty Level to **Average**. The map area for this lesson scenario is identical to the previous Lesson. Again, the airbase Good Guy 1 is present, as well as the USS Theodore Roosevelt. There are several Reference Points placed around the map that will be used during the Lesson.

6.11.1 Mission Types

This Lesson demonstrates the use of what is probably the most powerful and useful function in *Harpoon 3™*: the Mission Editor. Using this feature allows units or groups to perform a variety of missions. Ships, aircraft, submarines, or a combination of these platforms can be assigned to missions. Assigning units or groups to missions offers the user the flexibility of allocating various assets to perform specific functions continuously during a *Harpoon 3™* session.

Once units or groups are assigned to a mission they will automatically launch, transit, patrol, detect, and in most cases, prosecute enemy contacts. Missions are more than just patrols, however. They can be modified as the tactical situation changes during a scenario. There are three general types of missions:

- Area
- Strike
- Reconnaissance

For the purposes of this Tutorial Lesson, we will be creating one mission from each type. It is recommended that you read more about the various kinds of missions available under each type. Refer to the Mission Editor section (9.2.9) for further details.

6.11.2 Reference Points

6.11.2.1 Existing Reference Points

Many of the mission types utilize Reference Points to designate the area in which the mission will take place. Reference Points can be placed anywhere on the map. In this Lesson, there are six Reference Points already on the map. We will use these Points to create some missions later in this Lesson. Use the Data Block hot key to toggle the Reference Point names on.

6.11.2.2 Selecting and Deselecting Reference Points

A Reference Point can be selected in a manner similar to that used to select a unit or group. Click one of the **Reference Points** on the map. When selected, a Reference Point will change to a triangle. Multiple Reference Points can be selected at the same time by either clicking each in turn or drag-selecting several at the same time.

To deselect a Reference Point, click on it again and it will return to its unselected state. Go ahead and try selecting several Points using both the methods described above. When you are familiar with selecting Reference Points, set all the points so that none are selected.

6.11.2.3 Adding Reference Points

Let's create a new set of Reference Points. Click **Mission** and **Add Reference Point**; the mouse cursor will change to a pointer finger. Place the cursor on the point where you want the Reference Point to appear and click once. A small "X" will be displayed. Reference Points may also be added using a hot key. Place **two additional Reference Points** near Reference Points 1 and 2 using the existing Reference Points to form a **rectangle**.

6.11.2.4 Move Reference Points

Reference Points can be moved to new locations after they have been placed on the map. To demonstrate, select one of the **Reference Points you created** and click **Mission** and **Move Reference Point**. The mouse cursor will change to a pointer finger; click the **location** where you want the selected Reference Point to be located and the Reference Point will move to the new location.

MAKE SURE YOU ONLY HAVE ONE POINT SELECTED WHEN USING THIS FEATUREM

6.11.2.5 Naming Reference Points

Reference Points are numbered in the order in which they are placed on the map. The name of the Reference Point will be displayed with a datablock name of "Ref X" where "X" is the number of the Reference Point. Reference Points can be renamed by selecting the Reference Point and using a hot key. Go ahead and name one of the points you created to whatever you wish.

6.11.2.6 Deleting Reference Points

To delete a Reference Point, you do not have to select a point first. Instead, click **Mission** and **Delete Reference Point**; the mouse cursor will change to the pointer finger. Click the Reference Point you want to delete and it will disappear from the map. Reference Points can also be deleted using a hot key. Be careful you do not delete a Reference Point that is being used by a current mission. Go ahead and **delete** the Reference Point you just renamed and then create another one to replace it in the same spot.

6.11.3 Create a Mission

Let's start by creating an Area Mission using Reference Points 3, 4, 5, and 6. Select **each** of these Reference Points. Ensure that only these four points are selected; they will define the area in which the mission will take place. Next, click **Mission** and **Create Mission**. The Create Mission window will be displayed in the center of the screen.

6.11.4 Mission Name

An operation name will be assigned to the mission. This name is generated randomly from a list of words. Click on the text block and enter **AAW Patrol 1** as the mission name, overwriting what the computer chose for you.

6.11.5 Select Mission Type

We will now select the mission type. Let's send out an Area Anti-Air Warfare Patrol by clicking **Patrol AAW**.

6.11.6 Emission Control

In the same dialog window you have the ability to set the sensor status desired for the assigned platforms to use during the mission. There are three types of Emission Control:

- **Passive**: No active sensors to be used on the mission.
- **Intermittent**: Active sensors will radiate intermittently. A window will appear allowing you to set the interval, duration, and variance of the emissions.
- **Active**: Active sensors will be used during the duration of the mission.

For the AAW patrol you are creating, select **Active**.

6.11.7 Time Delay

Missions can be given a time delay so that they commence at a set number of days, hours, and minutes from when the mission is assigned. To assign a time delay, click the Time Delay text blocks and enter the desired delay.

ONCE YOU SET A TIME DELAY IT CAN NOT BE CHANGED AFTER YOU LEAVE THE CREATE MISSION WINDOWM IF YOU WANT TO CHANGE THE TIME DELAYL YOU WILL HAVE TO DELETE THE MISSION AND REBCREATE ITM FOR THE WAAW PATROL IM MISSION WE WILL NOT BE USING THE TIME DELAY FEATUREM

6.11.8 1/3 Rule

When the 1/3 Rule check box is selected, the AI will keep one-third of the assigned aircraft in the air. This applies to area missions only. If the 1/3 Rule check box is not selected, all of the aircraft assigned to the area mission are launched.

6.11.9 Edit Now

The Edit Now window allows the user to go directly to the Edit Mission dialog window. Click **Missions** and **Edit Now** as we still need to edit this mission. Click **OK**.

6.11.10 Edit Missions Dialog Box

After a mission has been created, units or groups need to be assigned before the mission may commence. The Edit Missions dialog box has three columns:

- **Missions**: This column lists all missions that have been created. "Plotted" will display all units currently being manually plotted. You should see "AAW Patrol 1" in this column as well.
- **Assigned Units**: This column lists all units that have been assigned to the mission currently selected in the Missions column.
- **Unassigned Units**: This column lists all units not assigned to a mission. Anything listed in this column can be assigned to a mission. Individual aircraft will not be listed here. If the word "Aircraft" appears in the column it means that there are aircraft available for missions at one or more of the bases, ships, or ship groups listed.

For this first mission, we will assign two F-14 Tomcat fighters to patrol for enemy aircraft in and around the rectangle made by the selected Reference Points. First, click **AAW Patrol 1** in the Missions column and **Add A/C** at the bottom of the window. The Assign Aircraft window will be displayed with a list of aircraft, their current loadout, ready status, and current assignment.

Also displayed in the bottom half of the dialog box are details concerning the loadout of the aircraft currently selected. Click on the **F-14 Tomcats** and then click **Assign**. A small dialog window will be displayed asking how many of these aircraft should be assigned to the mission. It should currently display 2, which is what we want, so click **OK**. The current assignment for the F-14 aircraft will now read "O/T Mission" which stands for "Ordered To Mission." Other aircraft can be assigned or readied using the Assign Aircraft window.

With the two F-14 Tomcats ordered to the mission, click **Continue**. You will now return to the Edit Missions dialog window. Click **AAW Patrol 1** in the first column. You can now see that the word "Aircraft" is listed in the Assigned Units column in the middle of the box. This means that there are currently aircraft assigned to the selected mission.

6.11.11 Confirm Mission Assignments

Click **OK** to provide final confirmation for the mission assignments and to exit the Edit Mission dialog window. The mission is now active and will launch shortly. The F-14s will launch and fly to the designated patrol area and begin flying in a patrol pattern searching for air contacts.

While the AAW patrol is launching, let's create a strike mission against the enemy airbase to the south of our airbase. Click the **enemy airbase** and then **Mission** and **New Mission**. The Create Mission dialog window will be displayed; change the mission name to **Ground Strike 1** and click **Ground Strike** for the mission type. Set Emissions to **Passive** and click **Edit Now**. Once you have these selections made, click **OK**.

6.11.12 Edit Strike Mission

From the Edit Missions dialog window, assign **four A-6 Intruders** to the strike mission using the same procedure used to assign the F-14s to the AAW mission. After the Strike mission is activated, let's continue with our third and last mission, Reconnaissance.

6.11.13 Create a Reconnaissance Mission

Select Reference Points 3, 4, 5, and 6 to designate the mission area. In the Create Mission dialog window, click **Recon Ship** and ensure Emissions is set to **Intermittent**. Click **Edit Now** and **OK**.

6.11.14 Edit Reconnaissance Mission

From the Edit Missions dialog window, assign **one P-3 Orion** to the recon mission using the same procedure used to assign the previous two missions. After the recon mission is activated, let's sit back and watch what happens.

6.11.15 Mission Behavior

The aircraft assigned to the three missions you created will all perform their assignments in different ways. The AAW mission will patrol the assigned area with active sensors and will engage any enemy air targets it contacts. The Strike Mission will fly to the target, drop bombs, and return to base. The Reconnaissance Mission will patrol the assigned area looking for enemy ships. If any ships are detected, the reconnaissance aircraft will not become decisively engaged and will attempt to identify and "shadow" the contact. For the purposes of this scenario, we have added several enemy contacts for you to deal with as you wish. Go ahead and experiment using the mission aircraft to engage the targets. We have provided you with extra aircraft if you desire to experiment with the other types of missions (refer to the Mission Editor section – 9.2.9 – for further details).

6.11.16 Ships and Submarines

All of our mission examples have been aircraft-related. Ships and subs can also be assigned to missions; the only difference between aircraft missions and ship or submarine missions is the use of the Assign Aircraft to Mission window. Ships and submarines can be assigned to a mission from the Edit Missions dialog window by selecting the mission and then double-clicking on the unassigned ship or sub.

This Lesson provides you with our old friends the Puller and the La Jolla. Experiment using the existing Reference Points, or points that you wish to create, to assign both of these two platforms to missions. You will find that they will take longer to get to their designated areas but that they will generally behave in a manner that is similar to the aircraft on missions.

6.11.17 Editing Existing Missions

The Mission Editor can also be used to edit existing missions. The Editor is accessed by clicking **Mission** and **Edit Mission**.

6.11.18 Freeing Units

You must remove a unit from its current mission before assigning it to another. Also, be aware that if you manually plot a course for a unit, that unit is considered by the AI to be assigned to a plotted mission and will therefore be unassigned, or removed, from that mission. Deleting the mission will free all formerly assigned units.

It is recommended that you read the detailed instructions for the Mission Editor (section 9.0) to become familiar with some of the details that were only covered briefly in this lesson. The *Harpoon 3™* Mission Editor is a vital part of the simulation and mastering it will provide you with greater flexibility and success as you play *Harpoon 3™*. Now let's move on to the next lesson, Lesson VIII: The Formation Editor.

6.12 Lesson VIII - The Formation Editor

Select **Lesson VIII: The Formation Editor** from the Scenario Selection window. It is recommended that your difficulty level be set to **Average** for this lesson. Select **Good Guys** from the Side Selection window.

6.12.1 The Formation Editor

This Lesson demonstrates the use of the *Harpoon 3™* Formation Editor. A formation is a group consisting of two or more units.

SUBMARINES CANNOT BE INCLUDED IN ANY FORMATIONM

The Formation Editor is used to position the units within a group in the best possible configuration to meet potential threats. In this Lesson, you will learn to create and arrange patrol zones within a formation's threat axes, and assign units to these patrol zones. There are three threat axes within a *Harpoon 3™* formation:

- Anti-Submarine Warfare (ASW)
- Anti-Air Warfare (AAW)
- Anti-Surface Warfare (ASuW)

User-created patrol zones can be assigned to each threat axis. This allows you to set units within the formation on patrols in areas relative to the formation's center as the group moves.

6.12.2 Starting the Lesson

As the scenario opens, you should see a group of four ships in the English Channel. This group has no mission and is currently set to move to a default formation. Default formations are quite limited in their design, so in this Lesson you will learn how to arrange the formation in such a way that the group is better protected.

Select the **group** and then click the **Formation Editor** toolbar button. Expand the window to full size and click the **Zoom Out** toolbar button **three times**. Now that we can see the group in the formation editor, let's begin by creating an Anti-Submarine Warfare patrol zone within the ASW threat axis.

6.12.3 The Anti-Submarine Warfare Axis (ASW)

The ASW threat axis is p laced in anticipation of incoming sub threats. As the formation moves, the ASW threat axis moves also, always facing the direction that the formation is headed. This allows you to create and assign a patrol zone to the ASW axis, assign an antisubmarine unit to it, and have that unit automatically transit to face the direction the formation is moving. As most sub threats the group will encounter will be coming from the direction of the group's Path of Intended Motion (PIM), this is a useful function for a group commander.

Turn on the sonar range rings by clicking the **PREF** toolbar button and selecting **ASW Sensor**. Click **OK**. Now find and select the **Arleigh Burke**. It should be apparent that since the Sir Bedivere has no sonar range ring, it is not an applicable unit for this patrol. Click the **Patrol Zone Formation Editor** toolbar button and **drag-select a zone** 1/3 the width of the open end of the ASW wedge (from the outer curved line of the ASW Threat Axis down to the fourteen (14) mile range circle). Try to center this in the ASW wedge if possible. After releasing the mouse button, a dialog window will be displayed prompting you to select the type of patrol movement.

There are three different possible movement configurations:

- **Sprint-Drift:** A high speed run across the patrol zone followed by a reduction of speed to drift. This is used to make passive sonar observations during the 'drift' phase.
- **Station Keep:** The unit alters course and speed as the formation moves to maintain a location in the center of the patrol zone.
- **Random:** The unit randomly selects a side of the patrol zone, finds the midpoint of that side, and then navigates there, repeating as needed.

For this patrol, select **Sprint-Drift**, and then select the **Arleigh Burke** again to update the display. You should see the newly created patrol zone. If the patrol zone is not satisfactory, you can create another to replace it by repeating this procedure. You may have noticed that the sonar range circle for the Arleigh Burke has changed size; this is because the ship is moving (or will be when we unpause the game), which limits the sonar's effective range.

6.12.4 High Value Units (HVUs)

HVUs are those units which must be protected by the formation, such as cargo or troop ships. Since the ASW axis is always facing the path of intended motion, the ideal place for HVUs is in the center of the formation, directly behind the leading anti-submarine unit.

Find and select the **Sir Bedivere**. Click the **Patrol Zone Formation Editor** toolbar button and **drag-select** a zone behind the ASW wedge that covers from about the one mile to the three mile range circle, making it 45 degrees across. Select **Station Keep** as the patrol type and click **OK**. Now that all the units assigned to the ASW threat axis are arranged, let's assign a patrol to the Anti-Surface Warfare Axis.

6.12.5 Anti-Surface Warfare Axis (ASuW)

The ASuW threat axis is used to anticipate and counter surface threats. Unlike the ASW threat axis, the ASuW need not necessarily change direction with the group. It will, by default, stay pointing in the same direction relative to the ASW axis, unless we either assign it a specific compass direction, or make it track a specific threat.

Find and select the **Ticonderoga**. Click on the small colored triangles in the Formation Editor window until you find the **ASuW axis**. Click the **outer arc** of the wedge and drag it until it is pointing due south. Now we will place the Ticonderoga on a patrol. Click the **Patrol Zone Formation Editor** toolbar button and drag-select an area centered in the wedge that ranges from the three to seven mile range circles and is approximately 1/3 the width of the wedge. Select **Station Keep** as the patrol type and click **OK**. Click the **Ticonderoga** again to display the patrol zone. Here we have set the ASuW axis to remain pointing due south.

6.12.6 Anti-Air Warfare Axis (AAW)

The AAW threat axis is primarily used to counter aerial threats. There are times when it is advantageous to make this axis tracking, meaning it will rotate to face the designated threat. For this Lesson, we want to assign an anti-air patrol to the AAW axis and have it track a source of possible air threats.

First, let's create the patrol. Find and select the **Stout**. Now, click on the colored triangles until you find the **AAW threat axis**. Click the **Patrol Zone Formation Editor** toolbar button and **drag-select**

an area within the AAW wedge that ranges from the seven to 10 mile range circles and is about 1/3 the width of the wedge. Select **Station Keep** as the patrol type and click **OK**. Click on the **Stout** again to display the patrol zone.

Now we will make the AAW axis track a source of possible air threats. **Resize** the Formation Editor window by clicking on the up and down arrow button and then drag the window to the right side of the screen to clear the view of the tactical map. Start the game for a few seconds and let it run until you detect the enemy base to the south, then **pause** the game. This is the source of the air threat that we want to track. In the Formation Editor window, click **Threat-Axes-Tracking Formation Editor** and once on the Tactical map window to activate it. Double-click on the **enemy base**. Next, find and select the **Stout** in the Formation Editor. Notice that the position of the AAW axis has changed to track the enemy threat. It will continue to rotate throughout the scenario, always facing the enemy base.

6.12.7 Aerial Patrols

In addition to the obvious advantage airborne units have in line-of sight detection, they can also be deployed to several specific patrol types. These are:

- **Combat Air Patrol (CAP)**: An aircraft carries an air-to-air loadout to engage enemy airborne units.
- **Advanced Early Warning (AEW)**: An aircraft carries sensor loadout to search for enemy units.
- **Dipping Sonar**: A helicopter will occasionally loiter and drop dipping sonar.
- **Sonobuoy**: A helicopter will drop a line of sonobuoys along the leading edge of the patrol zone.
- **Surface Combat Air Patrol (SUCAP)**: An aircraft carries an anti-surface loadout to engage enemy surface units.

For the purpose of this lesson, let's create a Sonobuoy patrol to watch for possible sub threats. First, **resize** the Formation Editor window by clicking once on the up arrow, then click the **Zoom Out** toolbar button **twice**. Next, **drag** the 14-mile range circle out to 25 miles and **drag** the 10-mile range circle out to 20 miles. This is to create a frame of reference for the patrol we are about to make.

Find and select the **Arleigh Burke**. Click the **Air Ops** toolbar button. Now, **drag-select** a zone centered in the ASW wedge ranging from the 20 to the 25 mile range markers. Make this zone 1/3 the width of the ASW wedge. A dialog window should be displayed, requesting that a patrol type be designated; click **Sonobuoy** and set **Radar**, **Sonar**, and **ECM** to **Passive**. Click **Continue**.

At this point, a window should be displayed listing all of the aircraft in the group that are not launching or already in the air. Select a **Sea Hawk** and click **Assign**, **OK**, and **Continue**. The remaining Sea Hawk will be used to maintain the patrol station when the one we assigned runs low on fuel or is destroyed in combat.

6.12.8 End of Lesson

Close the Formation Editor window (do not just iconize it), and then **plot a course** out of the channel and northeasterly to the Good Guy's Port. Pull up a tracking window centered on the group to observe how the assigned units respond to their new patrol orders. The base to the south will be sending hostile aircraft to test your new formation. From here on out you are on your own. Good luck!

Because managing formations effectively may be the most challenging aspect of play in *Harpoon 3™*, it is recommended that you refer to the Formation Editor section for further details.

6.13 Tutorial Summary

Congratulations! Now that you have finished all of the Lesson scenarios, you should be ready to start the scenarios contained in **Global Conflicts I**. The Tutorial Lessons are always available for review in case you want to brush up on a particular aspect of the game.

7.0 Navigation

I wish to have no connection with any ship that does not sail fast, for I intend to go in harm's way.
-Captain John Paul Jones

The **Navigation toolbar button** allows you to order a unit or group to move somewhere. To use the Navigator, click on the unit or group you want to move first, and then click on the Navigator button; the mouse cursor will change to a pencil.

Using the pencil cursor, click on where you want the unit or group to go. You can enter several points for a unit at a time by continuing to click on new places on the map. Each time you click you will place a small circle with line segments connecting the circles. These small circles are called waypoints. After a course has been plotted, the user can select individual waypoints to either move or delete them. Moving and deleting waypoints is simple:

- To move a waypoint, first select the waypoint and then drag it to its new location.
- To delete a waypoint, drag it to the previous or next waypoint.

THE CURRENT LOCATION OF THE UNIT OR GROUP IS ALWAYS CONSIDERED TO BE WAYPOINT OM

To insert additional waypoints, drag the small triangle that exists midway between two waypoints and release it where you want a new waypoint to appear. The small triangles are called midpoints. To exit the Navigator, click on the Navigation toolbar button again or double-click the last point in the path.

For air units, the Navigator's operation is simple; the unit flies from its current location to the new location, avoiding only threat polygons. For surface and submarine units, the operation is more complex since the Navigator must determine a path around whatever land masses may be in the way, as well as threat polygons. *Harpoon 3™* has a very good navigation routine, but it can be confused by a long course around a lot of land masses (such as an island group); if it can't figure out the whole course you had in mind, do it in stages. Also, the more complex the task, the longer the navigation routine will take; so, navigating around several islands may cause a unit to "sit and think" for quite a while. Note that a small "N" appears next to the unit when the navigation routine is working on its path.

7.1 Setting Waypoint Orders

At each waypoint in a unit's or group's path, you can have it Change Speed, Altitude, Depth and Sensor Settings. To do so, select the unit you want to execute the orders, provide a path for it (if you haven't already), and click on the desired waypoint. With the waypoint selected, use the appropriate toolbar button to give the unit or group a delayed order. The unit or group will execute the order when it reaches the waypoint. A waypoint order can be deleted by either deleting the waypoint or using the

Edit Waypoint Orders option from the Settings pull-down window. For more information about using the Navigation functions in *Harpoon 3™*, refer to Lesson II in the Tutorial section.

7.2 A Note about the Navigator

In the original *Harpoon*, as well as in many other wargames, the ability of a computer AI to plot a course on its own was a risky proposition at best. When the objects to be avoided (usually terrain) are large and regular, or perhaps simple bitmaps, a simple right/left path algorithm will work just fine. However, in *Harpoon 3™* we model coastline polygons whose vertexes are a minimum of 1000 yards apart, but vertexes from different polygons can be placed within 18 inches of each other. When a scenario may be thousands of miles across and your coordinate scale is 18 inches, the math becomes a little more complex.

The *Harpoon 3™* Navigator uses many different methods for finding a least-cost path for platforms. In many cases (such as with aircraft), the restrictions are not as stringent, but ships transiting straits or traveling great-circle paths on multiple map projections were extremely difficult to write. As it was, we used multi-threaded events to break up these calculations over a minute or more of real time. The game progresses normally while the navigator gets a share of the CPU every few microseconds to complete its tasks without stopping play.

Even with all the hoops and tricks we used, sometimes the Navigator will be forced to give up trying to solve a complicated navigation problem so it can service requests from other platforms. The moral of this story is "Don't select your ship in the Black Sea and ask it to navigate to Gibraltar on its own".

8.0 Attacking

We are outnumbered; there is only one thing to do. We must attack!
-Admiral Andrew Cunningham

FOR A COMPLETE LISTING OF ALL WEAPONS PLATFORMS AND SYSTEMS USED IN THE GAMEL PLEASE REFER TO THE PLATFORM DISPLAY OPTION UNDER THE WINB DOW PULLBDOWN MENUM

There are several ways to attack targets in *Harpoon 3™*. An attack can be a manual engagement where the user orders a specific unit or group to engage a target. Attacks can also be made automatically by assigning units or groups to either a Strike or a Patrol Mission. Attacks can be made against a known target that is currently in range, or when the exact location of the target is unknown an attack can be made as a bearing-only launch. Units or groups can also be ordered to close and attack when they are currently out of range of a target.

8.1 Manual Engagements

To engage a target manually, select the **unit** or **group** from which the attack will be launched. Next, click the **Attack** toolbar button. Finally, **double-click** (or **drag-select**) on the target unit(s) or group(s). If the target is in range of any of your weapons, the Weapons Allocation dialog window will be displayed, which allows you to assign specific weapons from each attacking platform to some or all of the designated targets.

8.2 Close-to-Attack

If a target you have designated is not in range, a dialog window will be displayed asking if you wish to have the attacking units close with the target and attack when they are in range. If you select **Yes**, the attacking unit will attempt to navigate an intercept to the target and engage it as soon as weapons are in range. This effectively places those units on an Intercept mission.

ANY UNITS SELECTED WHILE IN UNIT MODE AND ORDERED TO ATTACK WILL SPLIT OFF FROM THE GROUP TO DO SOM IF AN ORDER TO ATTACK IS GIVEN WHILE IN GROUP MODE THE GROUP WILL STAY TOGETHER AND MOVE TO ENGAGE THE TARB GETM

8.3 Staff Allocation

To have your staff automatically allocate appropriate weapons to targets, click **Settings**, **Staff Preferences**, and select **Allocate Weapons**. Even if you have your staff allocate weapons, you can still manually edit the allocation by clicking on the various selections in each panel on the Weapons Allocation window.

8.4 Manual Allocation

The Weapons Allocation dialog window has four sections containing lists: the attacking units, the weapons available for the unit selected, the designated targets, and a list of weapons that have been allocated to the selected target. These four sections are interdependent.

FOR EXAMPLEL IF YOU CLICK ON ONE OF THE TARGETS IN THE LOWER LEFT LISTL THE LISTING FOR ALLOCATED WEAPONS IN THE LOWER RIGHT LIST WILL CHANGE TO SHOW THE NUMBER AND TYPES OF ORDNANCE ALLOCATED BY ALL ATTACKING PLATFORMS AGAINST THE CURRENTLY SELECTED TARGETM IF YOU CLICK ON ONE OF THE ATTACKING PLATFORMS IN THE UPPER LEFT LISTL THE LISTING OF AVAILB ABLE WEAPONS WILL CHANGE TO REFLECT THE WEAPONS AVAILABLE FROM THE PARTICULAR ATTACKERM

To allocate weapons, make sure that the desired target is **selected** in the target listing and the unit you are attacking with is **selected** in the attacking platforms list. Next, **double-click** on the weapon you wish to allocate in the weapons listing. Each time you click, you will notice another weapon being allocated in the weapons allocated listing. To deselect a weapon, **double-click** on it in the weapons allocated listing. Each time you click, one unit of the weapon type will no longer be allocated. When deselected, the number of the particular weapon will increase in the weapons available listing. You can allocate weapons from each individual attacker to each individual target.

When you are finished allocating, click **OK** and the weapons will begin launching.

8.5 Bearing Only Attacks (BOL)

IN REAL LIFEL MOST SSMSL A FEW ARMSL AND NO AAMS CAN BE FIRED IN BOL MODEM IN GAMEL IF A WEAPON HAS THE WBOL CAPABLEW FLAG TOGGLEDL IT CAN BE LAUNCHED IN BOL MODEM PLAYERS SHOULD FEEL FREE TO DISCUSS THIS WITH THE AUTHOR OF THE DATABASE SHOULD THEY WISH TOM

Some weapons can be launched without designating a target; these are called Bearing Only Attacks, and they allow the player to designate a point on the map where the weapon's targeting sensors will activate and begin searching for a target. This can be useful if you have lost a contact but have a good idea where it is located and want to launch an attack without an exact fix on the target.

To launch a Bearing Only Attack press the Bearing Only Attack hot key. The cursor will change to a pointer finger. Move the cursor to the point you want the weapon's seeker to activate. Click **once** with the mouse button to designate the activation point. The Weapons Allocation window will appear with a list of Bearing-Only capable weapons. **Allocate** and **launch** in the same manner as before. The weapon's activation point will be listed as the target.

8.5.1 Surface-to-Surface Missiles (SSMs)

An SSM is a guided projectile (a warhead mated with a propulsion system) that can be launched from a variety of systems, including hand-held, vehicle mounted, towed, fixed emplacement, ship, or aircraft (including helicopters). They are used to engage ships and land targets; they are found on ships, some types of submarines, and in rare cases, bases with coastal defenses. No special procedure is required to launch surface missiles; however, submarines must be at a depth of Shallow or less.

MOST SURFACE MISSILES CAN BE LAUNCHED BEARINGBONLYM

8.5.2 Air-to-Air Missiles (AAMs)

An AAM is a guided projectile (a warhead mated with a propulsion system) fired from aircraft only. Their purpose is to seek out and destroy other aircraft. There are two types of missiles: heat-seeking (or, infra-red) and radar homing.

Heat-seeking, or Infra-red, guided missiles home in on the heat produced by an aircraft; this is usually their engine exhaust, but this can also be the aircraft's surface (which warms from friction of airflow across its surface). These types of missiles can be possibly distracted or knocked off course by the use of flares.

Radar homing missiles come in two flavors: active and semi-active. Active missiles carry their own radar and tracking systems on board, whereas semi-active missiles require guidance, usually from the parent aircraft that launched it but possible from an AEW platform.

THESE TYPES OF MISSILES CANNOT BE LAUNCHED BEARINGBONLYM

8.5.3 Surface-to-Air Missiles (SAMs)

A SAM is a guided projectile (a warhead mated with a propulsion system) fired from a ground-based launcher at aircraft. They come in all sizes, from shoulder launched versions to larger ones on mobile platforms or fixed installations. SAMs can also be used to engage missiles. In most cases, the platform launching SAMs must have radar active for SAMs to acquire their targets. Some types of SAMs, such as the Standards, can be used to engage surface targets as well.

MOST SAMS CAN NOT BE LAUNCHED BEARINGBONLYM

8.5.4 Anti-Radiation Missiles (ARMs)

An ARM is a guided projectile (a warhead mated with a propulsion system) usually fired from a specialist aircraft used in the Suppression of Enemy Air Defenses (SEAD) role. These missiles will lock

onto radar energy being broadcasted by enemy units and will home in on them. Usually, the radar they attack guide enemy SAM batteries; destroying these leaves supplemental waves of strike aircraft able to carry munitions intended for their target(s) instead of SAM batteries, increasing the number of weapons they can put on target.

ARMs can also be launched from surface ships. A specialized dialog window is used in conjunction with the Weapons Allocation dialog window; it lists the number of ARMs allocated and the various types of emitters radiating from a target. You can then allocate each individual ARM to a particular emitter.

ARMS CAN BE LAUNCHED BEARINGBONLYL BUT SINCE THEY GUIDE ON A RADIATING TARGETL IT IS NOT A WISE USE OF ORDNANCEL AS THE TARGET CAN TURN ITS RADAR OFF AT ANY TIMEM

8.5.5 Torpedoes

WHILE IN REAL LIFE TORPEDOES CAN HAVE SOME PRETTY AMAZING RANGES 9ESB PECIALLY FOR THE RUSSIAN WAKE HOMERSOL IN MOST CUSTOM DATABASES THEIR RANGE IS LIMITED TO ANYWHERE BETWEEN 5 AND 10 NMM

THE WEAPON HAS ENOUGH FUEL TO TRAVEL ITS FULL RANGE JUST THAT THE FIRB ING RANGE 9ENVELOPEO HAS BEEN REDUCED TO THAT 5 TO 10 NM RANGEM THE REASON FOR THIS IS TO GIVE THE AI A CHANCE AGAINST HUMAN PLAYERSM THE REDUCED RANGE FORCES THE AI TO GET IN CLOSE TO THE TARGET PRIOR TO FIRB ING ITS WEAPONSM

Torpedoes are the 'grandpa' weapon of the game, having existed in rudimentary form since the American Civil War. These are missile-shaped projectiles equipped with their own guidance system and underwater propulsion system, launched from torpedo-equipped ships, submarines, and aircraft, with the purpose of seeking out and destroying enemy submarines and ships. Launching a torpedo is similar to any other type of weapon; the only exception is with wire-guided torpedoes. These types of torpedoes are available on certain submarines and can be steered by the user.

To steer a wire-guided torpedo, select the torpedo symbol and alter its path in a manner similar to modifying a ship's course. The best method to steer is to grab the torpedo's waypoint and move it to where you want the torpedo to go. The ability to steer and use torpedo sensors is limited to wire-guided torpedoes only.

Torpedoes have both a passive and an active sensor. If, while steering the torpedo, your torpedo detects a target, it will home in on that target. To improve the ability to detect, click the **Sensor** toolbar button and **turn on** the torpedo's active sonar. Eventually, the torpedo will run out of fuel and be lost if it does not hit a target.

8.5.6 Aircraft Guns

Most aircraft (especially fighters) are equipped with small rotary Gatling-gun-type cannons, usually 20mm in size. These weapons are used in close-in dogfights between aircraft and sometimes to strafe enemy ground positions. Usually, this weapon is only used when all other ordnance has been expended.

Since the range for these types of guns is limited, be very careful that your aircraft are not endangering themselves trying to engage a surface target that has air defenses. Aircraft guns can be very effective against soft ground targets or ships without air defense capabilities.

8.5.7 Naval Gunfire

Ships of all types usually carry large guns, usually intended to engage other surface vessels and surfaced submarines, but some types of guns can be used in the anti-aircraft role as well. Also, these guns can be used to attack enemy ground installations, if within range. However, naval gunfire does not have the range of SSMs or SAMs; you have to get in closer to use these weapons. Each allocation of a gun is a burst that fires several rounds. The number of rounds per burst varies with each weapon.

8.5.8 Air Intercepts

Air Intercepts are functions of the Air Ops toolbar button. Refer to that section (10.3.3.5) for further details.

8.6 Automatic Engagements

If the Weapons State is set to **Weapons Free** (selected in Game Preferences under the Settings pull-down menu), units will automatically defend themselves against air and missile threats. If you do not want your units or groups automatically defending themselves, select **Weapons Tight** instead. Units or groups on Strike and Intercept missions, ordered to close-and-attack, or plotted intercepts will automatically engage enemy contacts.

8.7 Active & Passive Counter-Measures

8.7.1 Close-in Weapons System (CIWS)

Many ships are equipped with a Close-in Weapons System (CIWS) that is used as a last resort. CIWS is a rapid-fire Gatling gun that engages inbound missiles at close range. This defensive system is handled automatically.

8.7.2 Naval Guns

Some naval guns may also be used to engage an incoming missile or air threat. In *Harpoon 3™*, this type of point defense is handled automatically.

8.7.3 Chaff

Chaff is a cloud of radar-reflective material that is fired from ships and airplanes to confuse enemy radar. The most common use of chaff is to decoy inbound missiles. The launching of chaff is conducted automatically.

8.7.4 Flares

Flares are very hot incendiary devices that are fired from ships or aircraft to decoy heat seeking missiles. Flares are used and depicted in the same manner as chaff.

8.7.5 Jamming

Some ships and aircraft have the ability to jam enemy radar by transmitting powerful signals that interfere with enemy radar. To turn on jammers, click the **Sensor** toolbar button and select **Active** for the Electronic Counter-Measures (ECM) selection.

8.7.6 Blip Enhancers

Some helicopters are equipped with blip enhancers. This is an electronic device the sends out a strong signal that makes the helicopter look like a large, inviting target, thereby luring the missiles away from real large, inviting targets. To use a blip enhancer a helicopter must be flying near the ship that is targeted by enemy missiles. Click the **Sensor** toolbar button and select **Active** for ECM to activate blip enhancers.

9.0 Missions

A good Navy is not a provocation to war. It is the surest guaranty of peace.
-Theodore Roosevelt

9.1 Mission Types

- Anti-Air Warfare patrol (AAW)
- Air Intercept
- Area

9.2 Creating a Mission

9.2.1 Mission Planning

A mission is a pre-programmed operation where a specified platform (aircraft, ship, or sub) can perform a variety of tasks. Generally this involves a task specified by the player or AI. A typical mission will involve the destruction of a series of specified targets, a patrol, or a recon mission. In the more advanced scenarios this can be a very involved procedure, especially with aircraft logistics set to On. The Mission Editor is probably the single most powerful user tool in *Harpoon 3™*.

9.2.2 Mission Planning

"In war every problem, and every principle, is a duality. Like a coin, it has two faces. This is the inevitable consequence of the fact that war is a two party affair, so imposing the need that while hitting, one must guard." -B.H. Liddell Hart

War is not a set piece affair, in which contestants walk politely within striking distance of one another and then exchange blows according to a set of pre-ordained rules. War is a dynamic

process without hard and fast rules to guide the combatants. Analysts tend to use maxims or principles in the discussion of warfare, but their usefulness lies not in being constants, as Mr. Liddell Hart so aptly pointed out, but rather in being malleable sources of inspiration that an enlightened commander can apply at a decisive point in the engagement.

All tactical thought, from Sun Tzu to the modern day, contains contradictory elements if viewed exclusively from an academic standpoint. To practitioners of the art of war, however, the dichotomy is easily held, because they understand that each part of the contradiction is equally true at different points in time. As such, it is more important to understand battlefield dynamics than to memorize lists of tactical axioms. Without knowledge of the former, it is impossible to know when the application of any of the latter is relevant.

9.2.3 Fire and Movement

Although many of the comparisons between ground and naval warfare tend to oversimplify the peculiarities of each to reach a common ground, the basic tactical precepts of fire & movement are equally important in each arena. The objective of the tactical commander is the delivery of firepower in support of the mission. Maneuver is the method that allows the commander to attain position to deliver that firepower. Mobility is also significant to naval forces as an enhancement to survivability. Forces may strike decisively on a given day, avoid counter-detection, and mass for another strike hundreds of miles away the next day.

9.2.4 Intelligence Gathering

The ability to mass decisive firepower and move it quickly through the theater of operations is irrelevant if one cannot find a target to employ it on. Excluding land-based assets, which are all considered pre-targeted anyway, enemy forces enjoy the same degree of safety through mobility as your own forces do. As such, he who finds the enemy first while avoiding detection generally wins. Thus, from the initial stages of planning to post-mission egress, the primary focus of the commander must be on scouting.

Once located, the threat posed by an enemy force is diminished severely and not just because they have lost the element of surprise. If sufficient force exists, the commander may mass it against the threat to eliminate it. If you have limited resources against a superior threat, then avoidance of the threat becomes the best option. If you know the enemy's whereabouts, and they remain uncertain of yours, then avoidance is not difficult to achieve.

In that latter example is a fundamental truth that must be internalized. Scouting and intelligence gathering are not one-sided propositions. As the commander attempts to gather targeting data on the enemy, it is also necessary to make every effort to deny him the same luxury. The approaches one considers in this struggle depend on the geography of the area of operations, his assessment of enemy capabilities, and the specifics of the mission.

9.2.5 A Lesson in Geography

The Naval Officer assesses the impact of geography on the area of operations a little differently than his counterparts in the other services. Conventional topography is important in two instances: first, when one will send airstrikes ashore and seeks to use this topography to advantage in planning ingress and egress routes of the strike elements, and second, when one is forced to operate close to the shore and the topography delays detection of outbound enemy airstrikes. Bottom topography is critical if the enemy possesses either a mine or subsurface threat or if your own force will employ

these assets. Finally, other continental features are important whenever they compress the battle space afforded the commander.

Battle space is a theoretical bubble around a force in which the commander feels comfortable in detecting, tracking, and engaging threats before they can pose a significant danger to the main body. Whenever units are forced to operate in confined waters (e.g. the Tsugaro Straights off Japan or the Persian Gulf), the battle space has been compressed. Because the units are limited in the option of maneuver, the enemy can establish effective barrier patrols or minefields more easily. Also, the commander is constrained by physical borders, such as reefs or shallows, or legal borders like the 12 mile limit, in the positioning of pickets and screening units, which further reduces the reaction time allotted any threat which does materialize.

9.2.6 Know the Enemy

The significance afforded geographic features also varies based on the enemy's capability to capitalize on any of these areas. If, for example, one faced an adversary without a known subsurface or mine threat, then the only precautions necessary to sanitize a chokepoint prior to passage might be a surface or air sweep to identify and eliminate surface threats. Conversely, the possible presence of even an antiquated diesel boat in narrow, shallow waters is too deadly a contingency to be ignored. As such, the prudent commander must study the enemy Order of Battle and understand their capabilities. As one can never know enemy intentions with any acceptable degree of certainty, contingency planning must always remain focused on capabilities, no matter how remote their realization may seem.

This does not mean that the commander never enters the straits on the premise that a diesel boat might be lurking, as such timidity is tantamount to failure, but rather means that all prudent precautions are taken before risking the critical asset.

9.2.7 Laying the Course

Having invested considerable thought into the geographic anomalies of the area and the capabilities of the enemy Order of Battle (OOB), it is now time to plan intended movement. Keeping in mind that maneuver is the achievement of scouting and firing position over time, one must consider any time constraints imposed by the original mission on the ultimate objectives. Do the critical HVUs of the force have sufficient time to make a leisurely, cautious approach to the objective, or is it necessary to serve political expediency and rush to the fore? The answer to that question determines the degree of planning flexibility afforded the commander in determining the eventual timeline of engagement. Further, the timeline has a direct impact on tactics.

The geographic and navigational models of *Harpoon 3™* allow unprecedented realism in performing these stages of mission planning. Players who are willing to invest the planning time to consider the specific geography of the area of operations will be rewarded with commensurate improvements in their tactical success rate. Consider the satisfaction of the commander who correctly anticipates the presence of enemy forces and develops a contingency plan to eliminate that threat compared to one who destroys them only after their weapons are expended. In the latter case, even if the enemy units inflict minimal damage, they have achieved a degree of mission success by attriting the commander's defensive weapons magazines, which could prove crucial in subsequent engagements.

9.2.8 Summary

Once mission objectives are known, and the commander has identified the HVUs necessary to achieve those objectives, the next step is to plot the Path of Intended Motion (PIM) to achieve position and deliver the force necessary to complete the mission. In determining the PIM, it is critical that com-

manders consider the specific geography of the operational area and evaluate the enemy's ability to use that geography to their advantage.

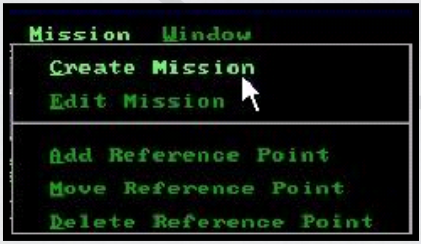
9.2.9 Understanding the Mission Editor

9.2.9.1 What is the Mission Editor?

The Mission Editor was an interface the developers provided in the scenario editor to get the AI to assign platforms to a range of behaviors. It is the principle tool the scenario editor/player uses to get their job done. It is composed of two parts: the **Create Mission Menu**, which allows you to create the basic characteristics of your chosen mission, and the **Edit Mission Menu**, which allows you to add units to the unit and make changes.

9.2.9.2 Where is the Mission Editor?

The Mission Editor is found under the Mission menu item. Within this menu are all the tools you need to create and edit your missions. The **Create Mission** selection opens the Create Mission menu; the **Edit Mission** selection opens the Edit Mission menu; and the **Add/Move/Delete Reference Point** selections allow you to manipulate the reference points you'll need to successfully create and edit missions.



9.2.9.3 Player Usage of the Mission Editor

This is kind of a potato/potatoe issue, in that some players will use it and some will not. Remember that the AI is constricted to the do what the code tells it to do, so you may not get "what you would do" out of it. It can be used to handle some of the menial or routine tasks such as AEW patrols or ASW work while the player handles everything else, freeing you up for more important matters.

9.2.9.4 Scenario Writer Usage of the Mission Editor

This is a must for any scenario writer to get the AI to do anything besides sit there. Learning the usage of it opens up a new world for the writer, giving them tools to create a challenging and/or realistic environment for the player. It is the only way to get the AI to fight well and create a fun game for players to enjoy.

9.3 Basic Operation of the Mission Editor

9.3.1 Create Mission Menu

The Create Mission Menu is the starting point for creating any mission you wish to generate within the game (with the exception of the Plotted Mission). You can access it by selecting the **Mission** pull-down menu. It is composed of several fill-in fields, check boxes, and radio buttons which must be completed to successfully create a mission. Only in this manner will your choices be entered into the Edit Mission dialog window.

9.3.1.1 Fill in Fields of Mission Menu

First we will explore the "fill in" fields: **Operation**, **Delay Time**, and **Variation**:

- The **Operation** field is fairly intuitive, as you just need to fill in the name of the mission. A random name will automatically populate this field.
- The **Delay Time** and **Variation** fields are key tools designed for dealing with timing. Filling in these fields (**Day**, **Hour**, and **Second**) gives you total control of when things happen. The **Delay Time** fields are intuitive as you set the time when your mission shall occur. Variation is a neat little feature allowing you to change your timing a little bit as missions are undertaken. Most players recognize that the AI is a creature of habit and by changing your 10 p.m. strike to 10:10 p.m. the next day may challenge the player's expectations a bit. Remember how that F-117 was said to have been shot down over Serbia? All it took was a nice watch and knowing when the aircraft were spotted the previous day.

9.3.1.2 Radio Buttons and Check Boxes of Mission Menu

Next we'll look at the radio buttons and check boxes provided in the interface. They are the mission selector radio buttons, the emissions control radio buttons; the 1/3 check box, and the Edit Now check box.

The Mission selector buttons allow you to choose the specific type of mission you would like to create. Your choices are as follows:

- Transit Missions (**Transit** or **Ferry**)
- Strike Missions (**Air Intercept**, **Ground Strike**, **Ship Strike**, **Sub Strike**)
- Area Missions (**Patrol AAW**, **Patrol ASu**, **Patrol ASW**, **Support**, **Recon Ground**, and **Recon Ship**)

You must select one of these to successfully create a mission by clicking the appropriate radio button next to each specific mission choice. All of these mission types will be explained in detail in the Understanding the Missions that Can Be Assigned section (9.4) of this manual.

The emissions control buttons allow you to choose the emission status (**Passive**, **Intermittent**, and **Active**) of each sensor type (Radar (**RAD**), Sonar (**SON**), and **ECM**). Select the radio button next to the setting you would like your sensor type to be at when the scenario begins. By default, all sensors are set to Passive initially and should be changed if you wish a sensor to be Active or Intermittent.

The **1/3 Rule** check box activates a rule that allows you to assign groups of aircraft to a mission in multiples of three, with one in each grouping of three launching at a time. For example, if you apply this rule to a grouping of three aircraft, one will launch at a time and another of that grouping will launch when the first aircraft that launched returns to base. Likewise, if you apply the rule to a grouping of six aircraft, two aircraft will launch initially and likewise be replaced by two more when the original two

return to base. This is incredibly useful when creating continuous air patrols as aircraft with expended ordinance or fuel will be replaced with the same number as long as replacements exist.

One caveat with the 1/3 Rule is you do not have to assign numbers divisible by three to have continuous air missions. As long as you add a number within each multiple of three you will get the same effect. So, applying the 1/3 rule to a mission with two aircraft assigned will yield one aircraft assigned to actively fly the mission at a time. A mission with four aircraft assigned will yield two aircraft assigned and a mission with eight aircraft assigned will yield three aircraft assigned.

If you do not wish to apply the 1/3 Rule to a mission, leave the box unchecked. This will cause all aircraft assigned to any mission you created to be launched at the same time. This is the default setting for all missions.

The **Weapons Free** check box, if selected, releases all weapons.

The **Edit Now** check box, when selected, allows you to continue editing the mission in the Edit Mission menu after you click **OK** in the Create Mission Menu. Leaving this box unchecked will exit you out of the Mission Editor completely but will save the mission you've created thus far; it can be accessed again by clicking **Mission** and **Edit Mission**.

When you feel you have successfully created a mission, click **OK** to continue. If you selected the **Edit Now** option, the next menu in the Edit Mission Menu. If you do not wish to save this mission, click **Cancel** to cancel the mission you have created.

9.3.2 Edit Mission Menu

The Edit Mission Menu is slightly intimidating at first glance. However, once you get the idea of how it works, it becomes very simple. You have three large lists to work with. From left to right they are **Missions**, **Assigned Units**, and **Unassigned Units**. There is also a large collection of buttons at the bottom as well as several radio buttons.

Select your **mission name** by clicking it in the Missions list. Look at the **Unassigned Units** list for a listing of units to choose from for that mission. When you find the unit you would like to assign, **double-click** it and it will be moved to the **Assigned Units** field. This is the method to assigning ships, submarines, or other units to a mission; more than one may be assigned.

If you want to assign an aircraft to the mission, click **Add AC**. This will bring up an inventory of your aircraft; select the **aircraft** you would like to assign, the **number** you would like to assign, and click **OK**. When you return to the Edit Mission menu, the aircraft you assigned will be displayed in the Assigned Units list in the assigned unit field and you are done.

The mission's sensor settings are there to allow you to change your EMCON status of the mission if you want to do so. Selecting the Intermittent setting (**Int**) on any sensor will bring up the Mission Sensor Intermittence window; this is where you set up your timings and variances for your sensor settings.

The **Weapons Free** check box, if selected, releases all weapons.

9.3.2.1 Mission Sensor Intermittence

Sensors set to Intermittent will go passive and active at set time intervals. This is determined in the Mission Sensor Intermittence men, displayed when any of the mission's sensor settings are set to **Int**.

This menu has two pairs (four total) of values to fill in. The first pair are the **Active Duration** and **Percent Variance**, while the second pair are **Passive Duration** and **Percent Variance**. The Active Duration field is where you enter the value for the number of minutes you would like this sensor to be active. The associated Percent Variance is the percent value change you would like your active value to change after each cycle. So, if you entered **10 minutes** active and a **20% variation**, the sensor will go active for 8 to 12 minutes. The Passive Duration field and its associated percent variance work the same way. Click **OK** once you are satisfied with your values.

The rest of the buttons and radio buttons are fairly straightforward. They give you the opportunity to go back and change anything you set in the prior mission or delete the mission altogether. When you are ready to continue, click **OK** and your mission will be created. You can always return to this menu later. Just remember to click the actual mission you would like to change before enacting your changes as you may inadvertently make changes to the first mission on the list.

9.4 Understanding the Missions That Can Be Assigned in the Game

Harpoon 3™ offers many specific missions (13 total). They are: **Plotted**, **Transit**, **Ferry**, **Air Intercept**, **Ground Strike**, **Ship Strike**, **Sub Strike**, **Patrol AAW**, **Patrol ASU**, **Patrol ASW**, **Support**, **Recon Ground,** and **Recon Ship**.

Keep in mind that any unit which can hold at least one aircraft is subject to a certain nuance within the editor. When the host platform, such as a ship or airbase, are assigned to a mission the aircraft that it holds are assigned to it as well. This is not beneficial in most cases. The reason for this is that the mission assigned to the aircraft may not be its logical or efficient usage of their 'talents.' In fact, you will see that if the parent is assigned to a mission that requires it to reach a Reference Point, the aircraft which has been assigned as well will launch and attempt to reach this Reference Point. There is some value to this if you want the aircraft to scout ahead, but in most cases another mission will put better use to said aircraft.

You can avoid this by unassigning the aircraft from the mission (using the **U** key) and then assigning it to a mission of its own. You may also use the Formation Editor to give this aircraft another mission with it.

Also understand that, at the start of the game, any unit that carries any sort of weapon(s) will strike the first identified enemy unit if it is not assigned a mission. Tomahawk carriers in particular are guilty of this and may salvo them off at the first land unit detected. This may be a problem if you don't want to waste the ordinance on the target it finds. Assigning them a mission will prevent this behavior from taking place as will starting the scenario with your **Weapons Tight** setting activated.

9.4.1 Plotted Mission

This is perhaps the most common mission you can create. It is not done within the Mission Editor, but instead with the toolbar on your display window. To create this mission, select the **unit** to assign, as-

sign its **speed** with the **Speed/Altitude** tool, assign its **course** using the **Navigation** tool, and assign the EMCON using the **Sensor** tool.

The platform you select will then follow the course you have assigned. You will notice that as you click on your map a line will be dropped and a small triangle will appear where you clicked. These work like waypoints; as you drop them, you may also change the speed and EMCON of your plotted unit which will change as you reach these Points.

9.4.1.1 Aircraft Assigned to the Plotted Mission

Aircraft can only be assigned this mission if they are airborne (if you dropped them into your game using the **Add Unit** selection from the Scenario Editor). These units cannot be assigned this mission independently if they are parked on a ship or at a land facility.

Aircraft assigned to the Plotted mission will follow the course and speed you give them, provided that fuel constrictions allow. They will engage any hostile platforms in their path, but will not deviate to engage.

Also keep in mind that their sensor arcs are pointing on the course they are traveling. When aircraft reach the end of its Plotted mission, it will it hold at Loiter speed at its last assigned altitude. Assigning aircraft to this mission is not recommended if you wish to have a repeatable mission (e.g. patrol).

9.4.1.2 Ships Assigned to the Plotted Mission

Ships assigned to the Plotted mission will follow the course and speed you assign them, provided that environmental conditions allow (navigation paths are clear of land, the weather is agreeable, and there is sufficient fuel to make the trip).

Ships will engage any hostile unit along their path with any weapon they have available; however, they will not go out of their way to engage. For example, if you have Harpoon missiles with a range of 75 miles, the ship is not going to maneuver to engage a target 80 miles away. Also keep in mind that if a ship must activate its radar, the radar will remain active for the duration of the scenario. When a ship reaches the end of its Plotted mission, it will set its speed to 0 knots and will be facing in its last ordered direction.

9.4.1.3 Subs Assigned to the Plotted Mission

Subs assigned to the Plotted mission will follow the course, speed, and depth you assign them provided that environmental conditions allow (navigation paths are clear of land, the weather is agreeable if traveling on the surface, and there is sufficient fuel to make the trip).

Subs will engage any hostile along their path with any weapon in their tubes; however, they will not go out of their way to engage. For example, if you have a target at 25 miles and your torpedo range is 22 miles, they will not go out of their way those three extra miles to attack. They will not load a tube with a Harpoon missile to reach the target, either.

You must also keep in mind that the sub will change its depth if the sea gets shallower. It will retain this depth through the rest of the transit even if the sea gets deeper again. When a submarine reaches the end of its Plotted mission, it will set its speed to 0 knots and will be facing in its last ordered direction.

9.4.1.4 Land Facilities Assigned to the Plotted Mission:

Land Facilities use this mission when they are assigned an EMCON. Anytime you assign a sensor state using the toolbar, the facility will be marked as being in a Plotted mission. It will engage targets if they come into range. If you select the Intermittent setting for any radar/sonar, there is an extra step involved; this was described above in the Basic Operation of the Mission Editor.

9.4.1.5 Strategy: Plotted Mission

The Plotted mission offers no attack/defense AI enhancements, but is a good general navigation order. It allows you to assign any course, speed, or altitude to a unit. You can therefore create circular paths, zigzags, transit doglegged waters, or any other path that the environment allows. Think of this mission as a Navigation-type only, with no attack or defense emphasis.

You can use this mission with aircraft to design your own strike groups. For example, if you attempt to create a regimental-sized Backfire raid using another mission, your aircraft are often bunched up or streamed along in a long line of raiders. If you like, you can use the Plotted mission to make each aircraft independent, timing their moves with others. Keep in mind, however, that this takes very careful planning.

The Plotted mission is also the only way to implement two missions per scenario for one unit or group. The basic idea is that missions other than Plotted that can be assigned within the Editor can be delayed by a time specified by the user. This allows the Editor to then add a Plotted mission that will occur until the delay time for the original mission comes to pass; this can involve for some fairly complex assignments.

9.4.2 Transit Mission

The purpose of a Transit mission is to move a unit from one point to another. This is accomplished by placing a Reference Point (preferably at your intended destination), selecting the Reference Point (which will make it into a triangle), opening up the Mission Editor, and then creating the mission. Ensure the unit you want to Transit is selected and click **OK**. Your unit is now assigned to a Transit mission.

9.4.2.1 Ships Assigned to the Transit Mission

Moving ships is the primary reason this mission was designed. Ships will always default to a Cruise speed. Keep the number of Reference Points low (preferably to a single one), otherwise, if you need a more complex path, use the Plotted mission instead.

9.4.2.2 Subs Assigned to the Transit Mission

Moving subs is another reason this mission was designed. It again is a way to move a submarine from a start point to a destination point. Submarines will always default to a Creep speed and go to the deepest possible depth. Again, use one Reference Point instead of multiple Reference Points; otherwise, if you need a more complex path, use the Plotted mission instead.

9.4.2.3 Aircraft Assigned to the Transit Mission

Aircraft cannot perform this mission. If an aircraft is airborne and assigned to this mission, it will simply return to base. If an aircraft is grounded and assigned to this mission, it will not launch.

9.4.2.4 Land Facilities Assigned to the Transit Mission:

Land Facilities cannot perform this mission.

9.4.2.5 Strategy: Transit Mission

To create variability in this mission, always set a delay of **one minute**. This way the actual path will be subject to change every time the scenario is started. When using this mission, always create and assign one Reference Point; it is possible to assign more but it is more efficient with fewer.

Keep in mind that once your unit or group reaches the Reference Point, it will not stop. It will continue trying to reach the Reference Point but will start a series of turns all around the compass constantly trying to reach it. It will not move more than a mile from it and will appear to be twisting and turning.

This is actually beneficial as it lets you anchor units to it. Hence, if you have a ship in port or a unit which must remain still, it is an excellent anchor to do this with while not keeping it as an inviting, stationary target.

9.4.3 Ferry Mission

The Ferry mission is specifically designed for the movement of aircraft from one air capable unit to another. To do so, selecting the **destination** unit (an airbase, aircraft carrier, or frigate), create a **Ferry mission** within the Mission Editor, and select the aircraft to send.

9.4.3.1 Aircraft Assigned to the Ferry Mission

Moving aircraft from one aircraft capable unit to another is the reason this mission was designed. The aircraft will always travel at Cruise speed and at High altitude. Ships, Submarines, and Land Facilities cannot be assigned to the Ferry Mission.

9.4.3.2 Strategy: Ferry Mission

The destination airbase must be within the aircraft's regular range in order to work properly. In other words, an aircraft can only fly as far out as half its range. If the aircraft reaches its maximum fuel radius, it will return to its home base. Even if an airbase is too far, the aircraft can still be launched on this mission but will be sent back to its base once it reaches that fuel radius point. Before assigning this mission, be sure to check the range to the destination to be ensure it is within this fuel radius.

This is an excellent mission type for neutral units, including airliners and airlift assets. You can assign replacements to be flown out to a carrier using this mission but they must be assigned to the carrier in its Formation Editor before the AI will make use of them.

9.4.4 Air Intercept Mission

The purpose of an Air Intercept mission is to intercept enemy aircraft. To do so, select the **Intercept** mission in the Mission Editor, click **OK**, and select the unit that you would like to accomplish this mission. The only nuance with this mission is that the target must be detected and identified it as hostile first. An undetected or unidentified aircraft will not trigger this mission.

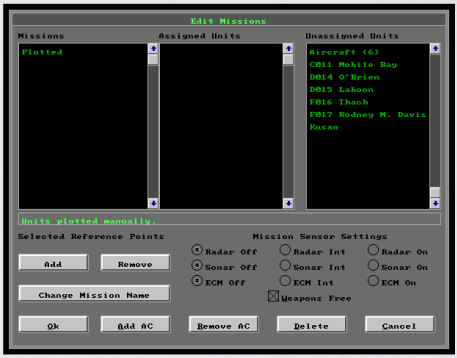
9.4.4.1 Aircraft Assigned to the Air Intercept Mission

Aircraft assigned to this mission will fly at High altitude at their fastest speed, and with the EMCON to what you set it until it reaches weapons range. If no target is present, it will conduct a search. This

mission makes AI aircraft very aggressive. Multiple aircraft may be assigned to the same Air Intercept mission.

9.4.4.2 Ships Assigned to the Air Intercept Mission

Assigning a ship to an Air Intercept mission has no effect. The ship will stay assigned to it, will engage enemy aircraft or ships in its engagement envelope, but will not move to intercept any enemy aircraft. The ship's course and speed will remain constant, which is the default course and speed set when the unit is placed. The ship also keeps the EMCON state assigned to it in the Mission Editor until an enemy aircraft enters its SAM range, when it will go active to engage.



9.4.4.3 Subs Assigned to the Air Intercept Mission

Assigning a submarine to an Air Intercept mission has no effect. In fact, assigning one to this mission is detrimental as the submarine will remain at periscope depth. Subs with SAM capability will engage enemy aircraft, but only if they enter the engagement altitude. Submarines will not maneuver to intercept.

9.4.4.4 Land Facilities Assigned to Intercept Missions

Assigning a facility (such AAA or a SAM unit) has no effect. The facility will stay assigned to it and will engage enemy aircraft that enter its engagement envelope, but no further benefit is granted.

9.4.4.5 Strategy: Air Intercept Mission

This mission is perhaps to best way to produce a very aggressive AI air force, particularly with an enemy AI that has a lot of detection assets available to it. Provided an enemy is detected and identified, the air units assigned to this mission will attack relentlessly. Their sensor arcs will always point in the proper direction. As mentioned above, it is not without limitation, as enemy aircraft must be identified as a hostile before any intercept is triggered.

9.4.5 Ground Strike Mission

The purpose of the Ground Strike mission is to destroy Land Facilities. There are two types of Ground Strike missions that can be performed: against a **known target** or against an **unknown target**.

The first, against a **known target**, is simple. Since this target is visible, **select it**, create the **mission**, select **Ground Strike**, and then assign the **units** you would like to strike it with.

The second, against an **unknown target**, is executed just as easily. All you need to do is create a **mission**, select **Ground Strike**, and assign **units**. The strikes will launch as new Land Facilities are detected and will not end until there are no more ground targets, weapons are all expended, or the game has ended.

9.4.5.1 Aircraft Assigned to the Ground Strike Mission

In *Harpoon 3™*, you have the ability to create your own strike packages. As you assign attack aircraft and/or bombers to a Ground Strike mission, you also have the ability to assign supporting assets with it, including covering fighters, jammer aircraft, and suppression of enemy air defenses (SEAD). However, as these missions are launched, each type will be broken up by aircraft type and weapon type. For example, fighters will be one group, attack aircraft in another group, and so on. Supporting aircraft will, however, support the Ground Strike forces assigned.

The only limitation here is aircraft speed; fighters may arrive much more quickly than lumbering bombers to a target area. Careful planning and mission mixing can help alleviate this. These missions will continue until the assigned target is destroyed or the scenario ends.

9.4.5.2 Ships Assigned to Ground Strike Missions

Ships can be assigned to Ground Strike missions as well. As above, you can strike either known or unknown targets. These missions are assigned as described above.

However, keep in mind that If a ship assigned to a Ground Strike mission has a long ranged weapon, such as a Tomahawk missile, they may fire it at the first enemy ground facility it detects regardless of the assigned mission. They will then attempt to engage the assigned target with whatever weapons it has left to it. So, your ships may expend valuable weapons at targets you do not consider high-priority; to avoid this ensure you assign a specific target or ensure the target you want to attack is the first one the ship detects.

9.4.5.3 Subs Assigned to a Ground Strike Mission

Subs can be assigned to Ground Strike missions as well. Again, the same method is used to assign them to this mission as described above and they can engage both known and unknown targets. Submarines will, however, need to go to Periscope depth to engage an enemy ground target, which makes them vulnerable.

Just like with ships, a submarine may strike the first ground target that they detect if they have weapons available to do so. And, as with ships, ensure either that the submarine has an assigned target or the target you want it to attack is the first one it detects.

9.4.5.4 Land Facilities Assigned to a Ground Strike Mission

Land Facilities can be assigned to a Ground Strike mission as long as they have a weapon that has the range to reach the enemy target. If they do not have a weapon with sufficient range, the friendly Land Facility will do nothing. These missions are assigned in the same manner mentioned above.

9.4.5.5 Strategy: Ground Strike Missions

When planning a Ground Strike mission against an enemy Land Facility, it may be wise to assign a specific target within that Facility; if you do not, the AI will choose for you, and may strike something you don't hold in the highest of priorities. In fact, given that runways of an enemy airbase are nearly indestructible, it may not be a wise idea to waste munitions on them.

Ungroup the enemy base and specifically target hangars, revetments, ammunition dumps, and fuel dumps as your first priorities. This will guarantee an airbase's destruction without wasting munitions and aircraft on targets that won't affect the base's operations as much. Ground Strike missions are generally straightforward, but planning for them pays in big ways. Simple Time on Target calculations

are available on various web pages to assist in this. Also, keep in mind that you do not always have to assign support aircraft and/or units to the same mission; you can create separate missions within the Mission Editor to accomplish your tasks. Creativity is key to success.

If you have a strike passage that has aircraft of different types and different numbers, you have another challenge to deal with. A small number of aircraft will launch faster than a large group of them. So, if you have a strike package that includes one Prowler and four Intruders with the same bomb load, the Prowler will launch much faster than the Intruders. Remember that due to the nature of the Ground Strike mission, the Prowler will launch independently and the Intruders will launch as a four plane group. This means that the Prowler may be well on its way before the Intruders can begin their journey. This would obviously leave the Prowler exposed. To overcome this problem, separate your Ground Strike missions with similar number compositions and make careful calculations of the times required for each aircraft to reach the target. Keep in mind that these missions do not allow you to create waypoints, so your attacks will always be on a direct line from their home base.

If a situation arises where many enemy units are detected at once and you have a Ground Strike mission assigned to an unknown target, the AI will tend to strike enemy units in the order that they were detected.

Always keep in mind that Ground Strikes against known targets will continue until the target is destroyed.

9.4.6 Ship Strike Mission

The purpose of the Ship Strike mission is to destroy enemy ships. There are two types of this mission that can be performed: against a **known target** or against an **unknown target**.

The first, against a **known target**, is simple. Since this target is visible, **select it**, create the **mission**, select **Ship Strike**, and then assign the **units** you would like to strike it with.

The second, against an **unknown target**, is executed just as easily. All you need to do is create a **mission**, select **Ship Strike**, and assign **units**. The strikes will launch as new Land Facilities are detected and will not end until there are no more ground targets, weapons are all expended, or the game has ended.

9.4.6.1 Aircraft Assigned to the Ship Strike Mission

In *Harpoon 3™*, you have the ability to create your own strike packages. As you assign attack aircraft and/or bombers to a Ship Strike mission, you also have the ability to assign supporting assets with it, including covering fighters, jammer aircraft, and suppression of enemy air defenses (SEAD). However, as these missions are launched, each type will be broken up by aircraft type and weapon type. For example, fighters will be one group, attack aircraft in another group, and so on. Supporting aircraft will, however, support the Ship Strike forces assigned.

9.4.6.2 Ships Assigned to Ship Strike Missions

Ships can be assigned to Ship Strike missions as well. As above, you can strike either known or unknown targets. These missions are assigned as described above.

Ships will travel at a speed of Full to reach their weapon's launch range. As with other Strike missions, they will attack the first target identified as hostile.

9.4.6.3 Subs Assigned to Ship Strike Missions

Subs can perform this mission and can engage known and unknown targets. They will run at periscope depth and run at a speed of Full at their assigned EMCON to attack targets. This is very dangerous, as subs are detectable at such a high speed and at periscope depth. Be aware of the submarine's surroundings before assigning this mission to it.

9.4.6.4 Land Facilities Assigned to Ship Strike Missions

This mission works well with Land Facilities as long as they have weapons that can engage ships. Land Facilities can perform this mission against both known and unknown targets.

9.4.6.5 Strategy: Ship Strike Missions

This mission is perfect for small surface ships, aircraft, and Land Facilities.

9.4.7 Sub Strike Mission

The purpose of the Sub Strike mission is to destroy enemy submarines. There are two types of this mission that can be performed: against a **known target** or against an **unknown target**.

The first, against a **known target**, is simple. Since this target is visible, **select it**, create the **mission**, select **Sub Strike**, and then assign the **units** you would like to strike it with.

The second, against an **unknown target**, is executed just as easily. All you need to do is create a **mission**, select **Sub Strike**, and assign **units**. The strikes will launch as new submarines are detected and will not end until there are no more submarine targets, weapons are all expended, or the game has ended.

9.4.7.1 Aircraft Assigned to the Sub Strike Mission

Aircraft are probably best suited for this mission. Upon detection of a target, they will launch and attempt to engage the sub target. If the submarine's location is not pinpointed, the assigned aircraft will begin a search pattern based on the information it has to pinpoint the sub and attack it. This pattern is always based on the detection diamond or circle and will systematically drop sonobouys until they are expended or the contact has been lost.

9.4.7.2 Ships Assigned to the Sub Strike Mission

Ships can perform the Sub Strike mission also. As soon as a submarine is detected and identified, the assigned ship will run at a speed of Full towards the target and attempt to engage. The ship will launch its weapons when in range and will hunt the submarine until the contact is lost. This mission is highly recommended for ASW-type ships. They will behave as they do in real life in their pursuit of enemy submarines.

9.4.7.3 Submarines assigned to the Sub Strike Mission:

Submarines will wait at Periscope depth until they detect an enemy submarine; once they do, they will run at a speed of Full towards the target and attempt to engage. This mission is not recommended for submarines, as they are extremely vulnerable at those speeds and depth.

9.4.7.4 Land Facilities Assigned to the Sub Strike Mission

No known Land Facilities have been built to perform this mission.

9.4.7.5 Strategy: Sub Strike Missions

Aircraft and ASW ships perform this mission well. All others can perform the mission, but the detriments to assigning them outweigh the benefits.

This mission is perfect for dedicated ASW aircraft. The reason is they will act per naval doctrine; when a submarine is detected, aircraft will be launched to localize and prosecute the contact.

9.4.8 Support Mission

The Support mission involves units supporting each other. This is a mission that would be assigned to all support ships, aircraft, and submarines to help another unit in its mission. Usually, Support missions involve "covering" another unit while it conducts some kind of Strike mission; an F-14 Tomcat protecting an A-7 Corsair from enemy fighters is a good example of support. To assign this mission, assign **Reference Points**, **select** them, create the **mission**, select **Support**, and click **OK**. You then assign units to this mission.

9.4.8.1 Aircraft Assigned to the Support Mission

This is the most useful application for the Support mission. All aircraft assigned to this mission will fly at a speed of Cruise and at High altitude. Once they reach the designated Reference Point, they will remain at this speed and altitude. If there are multiple Reference Points, the assigned aircraft will loiter momentarily at one before continuing on to the next Reference Point.

9.4.8.2 Ships Assigned to the Support Mission

This mission works with ships, but has no applicable use other than to act as an anchor. If you assign a ship to this mission, it will travel to the Reference Point at a speed of Cruise. Upon reaching this Point, it will stay there.

9.4.8.3 Subs Assigned to the Support Mission

This mission works with sub platforms, but has no applicable use other than to act as an anchor. If you assign a sub to this mission, it will travel to the Reference Point at a Shallow depth and at Creep speed. When it reaches the Reference Point, it will remain in place.

9.4.8.4 Land Facilities Assigned to the Support Mission

There is no value in assigning a Support mission to a Land Facility.

9.4.8.5 Strategy: Support Mission

Support aircraft are best assigned to this mission. AEW and tankers are preferred as the Reference Points in this mission will anchor them, preventing their wandering into enemy AAW range or aimlessly around the map.

9.4.9 Recon Ground Mission

The purpose of the Recon Ground mission is to identify any Land Facilities along a path marked by assigned Reference Points. To assign a unit to the Recon Ground mission, create a **Reference Point** (or **points**) at specific locations you want to reconnoiter, **select** them, create a **mission**, select **Recon Ground**, click **OK**, assign the **aircraft** you wish to assign this mission, and click **OK** again.

9.4.9.1 Aircraft Assigned to the Recon Ground Mission

These are the units this mission was designed for and therefore should be the only unit types assigned. When you assign an aircraft to this mission, it will fly to the Reference Point(s) in the order they were assigned.

Aircraft altitude will change during this mission. Initially, an aircraft will fly at Medium altitude and at Cruise speed. When it closes in on the first Reference Point, it will drop to Low altitude. Once it reaches the final Reference Point, it will move to return to base at High altitude.

This mission is perpetual. The aircraft will rearm/refuel and then will go out on the same mission again. This continues until the aircraft is destroyed or the game ends. Only one aircraft can be assigned to each particular Recon Ground mission you assign. If more than one is assigned, the excess aircraft will not launch.

9.4.9.2 Ships assigned to the Recon Ground Mission

Ships cannot be assigned to this mission.

9.4.9.3 Subs assigned to the Recon Ground Mission

Submarines cannot be assigned to this mission.

9.4.9.4 Land Facilities assigned to the Recon Ground Mission

Land Facilities cannot be assigned to the Recon Ground Mission.

9.4.10 Recon Ship Mission

The purpose of the Recon Ship mission is to identify detected ships. To assign this mission to a unit, create a **Reference Point** (or **points**), **select** them, create a **mission**, select **Recon Ship**, click **OK**, select the **unit** you would like to assign to the mission, and click **OK** again. If you delay the mission by one minute, the first destination Reference Point will change each time the mission is run.

9.4.10.1 Aircraft Assigned to the Recon Ship Mission

Aircraft assigned to a Recon Ship mission will fly out to the assigned Reference Point(s). Upon detection of an unknown ship (through any means), the aircraft will change course to investigate; once they achieve identification the aircraft will (if fuel allows) return to its assigned Reference Point(s).

Assigned aircraft will fly at High altitude and Cruise speed. Aircraft assigned to this mission will continue traveling to Reference Points and identifying contacts until they run low on fuel and return to their airbase.

9.4.10.2 Ships Assigned to the Recon Ship Mission

Ships assigned to the Recon Ship mission will transit out to the assigned Reference Point(s). Upon detection of an unknown ship (through any means), the ship will change course to investigate; once they achieve identification the ship will return to its assigned Reference Point(s).

Assigned ships will travel at Cruise speed. Ships will continue traveling to each assigned Reference Point and identifying contacts until they run out of fuel and the scenario duration ends. Ships will only act in self-defense while assigned to this mission.

9.4.10.3 Subs Assigned to the Recon Ship Mission

Submarines assigned to the Recon Ship mission will transit out to the assigned Reference Point(s). Upon detection, the sub will change course to investigate.; once they achieve identification the sub will return to its assigned Reference Point(s).

Subs assigned to this mission always transit at Shallow depth and travel at Creep speed. If a new contact is located the sub will accelerate to Cruise speed in an attempt to move into range to make an identification. Once identification is made it will return to Creep speed and return to its assigned Reference Point(s). Subs will only act in self-defense while assigned to this mission.

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9.4.10.4 Strategy: Recon Ship Mission

Assign more than one Reference Point to this mission, close to expected enemy activity, to ensure the assigned unit covers a lot of ground.

The kind of EMCON to use is up to the player. Active and passive settings have their advantages and disadvantages. Notably, if you're using active settings the enemy can detect and identify your unit faster than it would otherwise. If you're using passive settings, your unit must move closer to identify.

10.0 Formation Editor

Any commander who fails to exceed his authority is not of much use to his subordinates.
-Admiral Arleigh Burke

10.1 Introduction

The **Formation Editor** is one of the most advanced features of the game; it is an extremely useful tool to efficiently manage your operations. The Formation Editor allows players to automate most operational concerns of their groups, allowing them to concentrate on more pressing tactical issues. However, the best thing about the Formation Editor is that players are not forced to use this feature in its entirety to play the game. The Editor was included so a player can select the amount of AI assistance they want. The player has the option to do with the Editor as they will.

This section will cover the Formation Editor in its entirety. It will answer a few basic questions and then move into in-depth descriptions and step-by-step directions of the Editor's various functions. A practical example of use of the Formation Editor is also included.

10.2 Basic Questions on the Formation Editor

10.2.1 What is the Formation Editor?

The Formation Editor is a useful tool created by the *Harpoon 3™* design team to give players and scenario editors the ability to automate the micromanagement of units formed into groups. It accomplishes this by allowing the player to assign individual units into patrol zones along an assigned threat axis (AAW, ASW, or ASuW) which will be retained for the duration of the game or until otherwise

ordered. Its usefulness lies in the fact that once a player or scenario writer has accomplished this task, they can concentrate on more pressing issues in the simulation while the AI is handles the inner management of their groups.

10.2.2 When is a good time to use the Formation Editor?

The Formation Editor should be used at the beginning of every scenario to make sure that units are where the player would like them to be within each group they control. All other functions are optional and can be changed or used at any time during the game.

10.2.3 What Should I Do Before I Use the Formation Editor?

You must decide how much control you would like over your formations and the game itself. The designers have provided a series of preferences (found in the Game Preferences menu and the Harpoon 3.ini file) that allow you to allocate control between you and the AI. It is your game and your choice how you wish to use these preferences.

To play a game in which the player has total control and no AI control beyond what is ordered, it is critical that several game preferences be turned off. The reason is that the game has progressed to a point well beyond its original design, and sometimes incorrect aircraft assignment and inefficient sonobouy deployments could be experienced by activating these preferences.

You have two ways to turn these features off. The first is temporary, using the Game Preferences menu within the game, which will turn them off during the current game only. The second is permanent, by modifying your Harpoon 3.ini file (which can also be accomplished with the *Harpoon 3™* Launcher).

The Game Preferences menu is accessed by clicking the Settings pull-down menu. The Preferences that should be turned off are located under the **Staff Handles** heading. Using this menu works for the duration of the current game.

The Harpoon 3.ini file is found in the *Harpoon 3™* directory of your computer. Using Windows Explorer, navigate to this file and double-click on it to open, or use a text editor like Notepad instead. Modifying this file keeps your preferences permanent (or until you return to the .ini file to change them). The entry you want to modify looks like this:

```
; ========================================
; The following preference is for the
; amount of assistance the AI gives the human
; player. The bits in the value are assigned as
; follows
;
;  Navigate paths                1
;  Allocate weapons              2
;  Assign threat axes            16
;  Default formations            32
;  Manage Air Assets             64
; ========================================

ExecutiveOfficerAssistance 0
```

As you can see we have already modified this one so no options are marked as “on.” Keep in mind that this is the proper set up to give the player total control.

The nice feature of these options is that you can gear the level of AI assistance to your liking. The only requirement is that player set up patrol zones so their formations stay in position during game play. This is accomplished by setting all of your ship's patrol zones to the ASW threat axis. Given that the ASW axis is always set to the path of intended motion, the units will not break formation unless attacked by a torpedo.

10.2.4 What Are Formations and When Can I Use the Formation Editor?

All units within the game, with the exception of submarines, can be formed into formations. This is accomplished by clicking on a unit and dragging it to another unit. The unit that you drag to will always be the center of the formation. Once this has been accomplished, click the **Formation Editor** button and begin working in the Formation Editor. Given the functionality of the Editor and the types of commands given, the Editor is best used with groups composed of surface warships.

10.2.5 Where is the Formation Editor?

To access the Formation Editor, first click the **formation** or **group** you would like to edit, and then click the **Formation Editor** toolbar button.

10.3 Functionality

10.3.1 The Basic Idea

The basic idea of the Formation Editor is to assign platforms to patrol zones based on threat axes. What you are doing is setting up a template for the AI to micromanage your groups by. You can then shift your defenses with relative ease by simply shifting the threat axes you are working with in a new direction to face a new threat, or you can let the AI do this for you.

You've got three axes to work with in the editor: **ASW**, **AAW**, and **ASuW**. These three axes are oriented from the center of your group. You can only have one of each type of axis for each formation. So, all of your AAW assigned ships will work with one axis, all of your ASuW assigned ships will work with another, and so on. These ships will still carry out other defensive tasks, but their primary orientation will be to their assigned axis.

To assign a platform to an axis, select a **ship**, which will bring your axis selection triangles into view. Click the **triangle** of the corresponding axis you would like to assign this ship to, which will bring the axis into view. Now, click the **axis** and shift it in the **direction** you think your threat will come from. You can change the width (by clicking and dragging the sides) and the bearing (by clicking and dragging the end). Once this is accomplished, click the **ship** again and then click the **Patrol Zone Formation Editor** toolbar button.

Click **OK** when finished and you've assigned a ship or aircraft to a particular arc. Work through the rest of your formation in the same way. Just remember that the axis you see is the axis your ship is assigned to; *Harpoon 3™* helps by using the same color to mark the PZ as it does the axis.

You're probably wondering now how this helps you out. Let's say you initially set up your AAW axis to the port (that's the left side) of your group, expecting the main attack to come from that direction. Now you soon find out that the threat is in the opposite direction instead. All you have to do to fix this is open the **Formation Editor**, click and hold the **AAW axis**, and slide it in the proper **direction**. The vessel you had assigned to the axis will begin moving to cover your newly defined threat axis. You can

then quickly click out of the Formation Editor and move on to more pressing issues, knowing that your vessels will move to the proper defensive positions. The patrol zones are fixed, so as you move that axis the patrol zones move along with it.

10.3.2 Display Window

Looking at this workspace you will have two main areas of interest. The first is the display window that gives you a visual representation of your group, range measurements, and threat axes. The second area is the Formation Editor toolbar that includes a series of nine buttons that have specific functions in the editor. You must use these two together to successfully use the Formation Editor.

10.3.2.1 Formation Editor Display Window and Its Functions

The Display Window is the visual representation of your formation. It is composed of a circular plot, the units you've added to the group, the threat axis marker triangles, and one visible threat axis at a time (the others are visible by clicking the threat axis marker triangles). This window is like your tactical display and gives you the option to view a lot of information. Like your tactical display, you can also change its size and location using the same window function buttons.

Circular Plot

The circular plot is simply a visual reference that lets you set up patrol zones in a logical arrangement in reference to the center of the formation. This center would be the center of the group's gravity (where command or HVUs lurk to provide them the most amount of safety possible). This plot is marked by measures of radius in nautical miles, and is editable by clicking and dragging the circles in or out. This allows you to set up formation displays of any reasonable size (depending on your comfort and map size).

The Units within the Plot

Viewing units within the circular plot, you will see that all of the units you've clicked and dragged together to form the group are included. The unit that you clicked and dragged everyone else to is at the center of this formation.

You will notice a small PIM (Path of Intended Motion) lines stemming from each unit. You can click and select any unit, which will then be surrounded by a selection box. You can then use any of the other functions within the Editor to issue this unit specific orders.

ASW, AAW, ASuW, and Corresponding Marker Triangles

You will notice several colored axes (wedges) and corresponding marker triangles within your circular plot. These are threat axes and are very important to the management of your surface groups. These are your tools to indicate to the AI where expected threats will come from and where the AI should concentrate its efforts in each particular case.

To activate the axis simply click on any vessel which will bring one into view. You will see small triangles within the circular plots that correspond to each axis as well as their positions. Simply clicking the triangles will allow you to view a particular axis. You can only view one axis at a time. To view another axis, click on the corresponding triangle in the circular plot.

To manipulate an axis the procedure is simply click, hold, drag and release. By clicking and dragging the end of each axis you can shift them in any direction you would like. Keep in mind that the ASW

axis is locked to the path of intended motion, so it cannot be shifted. To change the width of each axis simply click on the sides of the axis and drag to the appropriate size.

Antisubmarine Warfare (ASW) Axis

The ASW Axis will always be facing the Path of Intended Motion (PIM). The reason for this is that is where most ASW threats are expected to come from. The ASW axis will not affect sonar performance, so the direction the axis is pointing does not imply better sonar performance.

Anti Air Warfare (AAW) Axis

The AAW Axis is set to the expected direction of an air threat. This axis can be set by the player and will remain in the same direction until the player or AI changes it. To set this axis, click, hold, and drag the axis to the heading you would like.

Anti Surface Warfare (ASuW) Axis

The ASuW Axis is set to the expected direction of a surface threat. This axis can be set by the player, and will remain in the same direction until the player or AI changes it. To set this axis, click, hold, and drag the axis to the heading you would like.

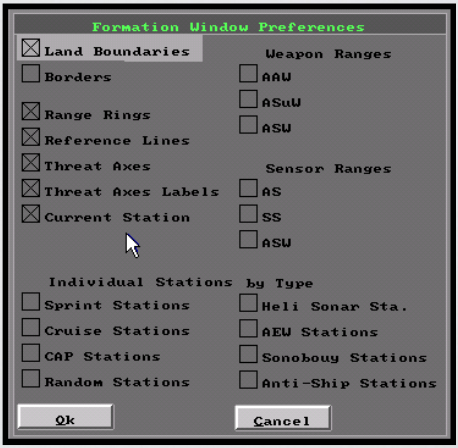
10.3.3 Display Window Buttons

10.3.3.1 Zoom In Toolbar Button and Zoom Out Toolbar Button

These buttons allow player to zoom in and zoom out, respectively, the Formation Editor display.

10.3.3.2 PREF Toolbar Button

This button allows players to set certain display options for their Formation Editor display. When clicked the Formation Window Preferences window is displayed, allowing selection of certain visual properties of the display. To select or deselect an option, click the associated boxes. Click **OK** to process the choices made or **Cancel** to close the window without processing them.

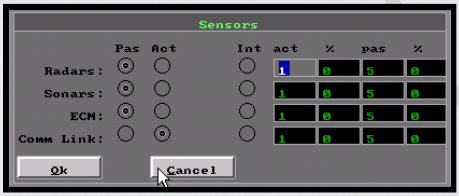


10.3.3.3 Sensor Toolbar Button

This button allows players to set emission conditions for each individual unit in a formation. As in all other emission control menus, you will need to set each type of sensor to the appropriate setting (Active, Passive, or Intermittent). Any

unit in your group which has a sensor set to Active will cause the entire group's emission condition to be reported as active although that may only be true with one particular sensor. This does not mean that an enemy will detect your entire group (they will only detect that sensor).

How Intermittent Sensor Settings Work in the Formation Editor



You have four paired values to fill in. The first two are Active Duration (**ACT**) and Percent Variance (**%**). The second pair is Passive Duration (**PAS**) and Percent Variance (**%**). The Active Duration field is where you enter the number of minutes you would like this sensor to be active. The associated Percent Variance is the percent value change you would like your active value to change after each cycle. So if you entered 10 and a 20% variation, your sensor will go active for 8 to 12 minutes. The Passive Duration field and its associated percent variance work in the same manner. Click **OK** to save your choices or **Cancel** to exit the window without saving.

10.3.3.4 Patrol Zone Formation Editor Toolbar Button

This button allows player to set individual patrol zones to individual surface units within a formation, as well as setting a type of patrol zone.

To create a patrol zone, click a **unit**. Next, select the **threat axis** you wish to assign the patrol zone to. Then click the **Patrol Zone** button and then move your mouse cursor to the area you would like that zone to be. Click and drag to form the **zone**. When finished, **release** the mouse button. You will now be prompted as to how your selected unit will maneuver in your newly drawn zone; to this end a menu will be displayed, allowing you to choose between **Sprint-Drift**, **Station Keeping**, or **Random**.

To delete a patrol zone assignment, simply reassign the surface unit using the same procedure as described above. Surface units must always be assigned to a patrol zone or the AI will assign the ship to whatever it thinks it should be which could have some undesirable results.

Sprint-Drift

This is a patrol pattern where units will race at full speed and then drift, allowing good usage of passive sonar. This is a typical ASW pattern used by modern navies worldwide. Great care must be taken with this type of zone, however; assign them in logical patterns (around 8 miles or longer) ahead of your group. Sprint-Drift Patterns that are too short or improperly oriented may consume your escort's fuel at an inefficient rate and slow your group down. Escorts assigned to this mission must have sufficient enough speeds to keep up with your main body. If they do not, assign them to a Station Keeping patrol zone.

Station Keeping

This will enforce a constant distance and heading relative to the center of the formation. The ship will always remain in the same zone and keep up with the rest of the group. A typical Station Keeping patrol zone should be no larger than 2 by 2 miles in size.

Random

This setting causes the unit to select a random side of its assigned zone and travel to its midpoint to take up a station. Always use this setting with larger zones; in terms of distances and sensor detection, small zones may make this setting irrelevant.

10.3.3.5 Air Ops Toolbar Button

As its name implies, the Air Operations button allows you to assign embarked aircraft to patrol zones within threat axes.

To assign aircraft to the formation's air patrols, first select the **corresponding axis** you would like to assign the aircraft to and then select the **unit that hosts the aircraft** you wish to assign. Click the **Air Ops** button and then click, drag, and release your **patrol zone** as with a standard ship patrol zone. When complete, click the **Formation Air Operations** button once again.

A new Select Patrol Station/Type menu will then be displayed. This allows you to choose from five different types of formation air patrol zones: **CAP**, **AEW**, **Dipping Sonar**, **Sonobouy**, and **SUCAP**.

Once you select the mission you would like, click the appropriate radio button. When you do this the **Sensors** menu will be displayed; set the appropriate emission controls for each type of sensors you have with your platform. When complete, click **OK** and you will be directed to the Assigned Aircraft menu.

CAP (Combat Air Patrol)

This mission is generally associated with the AAW Threat axis. When issued, aircraft will launch from their host unit and engage any aircraft entering its associated zone. These aircraft are anchored to their positions and will act defensively unless an identified enemy contact moves into engagement range.

This is a very useful patrol zone but should be limited in use. The AI tends to be fairly liberal with the amount of aircraft assigned to this mission and will send them up in flurries. It is advised that you assign very few aircraft to these patrol zones; assign aircraft to AAW patrol missions and intercept missions in the Mission Editor to ensure that not too many are sent on CAP. The only aircraft that should be assigned to this patrol zone are those that have an AAW role. For best effect, be sure that the Formation Air Patrols option in the Staff Handles menu is **off**.

AEW (Airborne Early Warning)

This mission is generally associated with the AAW threat axis, although it may be associated with others as well. When orders are issued, aircraft will launch from their host unit and survey the drawn patrol zone.

This function is very useful; however, ensure that only AEW aircraft are assigned to this mission (E-2 Hawkeyes, Sea King AEW, Helix AEW, etc.) to take advantage of their advanced sensors. Keep in mind that the position of these assets usually will give your opponent a good idea where your carrier battle-group is (since most of them carry AEW aircraft), so great care must be taken in positioning.

Dipping Sonar

This mission should be associated with the ASW Threat axis. Units ordered to this mission will take off and patrol their assigned zones with their dipping sonar. Upon detecting a contact, they will move to localize and attack it.

This is another useful function. This patrol should only be assigned to aircraft with dipping sonar and they should be placed in useful but efficient positions with sonar emissions turned **on**. 'Useful positions' include anywhere you think an attack submarine would be if it wanted to engage your HVUs, but not close enough to fire torpedoes. 'Efficient positions' are locations where they can be useful but where they would not be expending fuel at a rate that would prevent long on-station times. As a rule of thumb, 30 nautical miles is the maximum you would want to use.

Sonobouy

This mission should be associated with the ASW Threat axis. Units ordered to this mission will take off and begin patrolling their assigned zones, dropping patterns of sonobouys. Upon detection of a contact they will move to engage. When sonobouys or fuel is expended these units will return to base to reload.

Many navies have their units drop sonobouy barriers, but not many as these are a finite resource to a fleet at sea. However, *Harpoon 3™* has no logistics settings for sonobouys so you can drop as many as you like.

Technically, use of this mission is a bit off doctrine. In most cases, navies will use host units with good sensors (e.g. towed arrays, VDS) to detect distant contacts. They will then launch ASW helicopters with sonobouys to localize, identify, and prosecute submarines. As such, this patrol zone does not match that model. However, assigning a Sub Strike mission to embarked helicopters in the Mission Editor does exactly that, so you would be better off using a Sub Strike mission rather than selecting a Sonobouy air patrol zone mission. Use dipping sonar missions to carry out responsibilities within your groups.

If you do decide to use this type of patrol zone, ensure that assigned units are ASW types with sonobouy load-outs.

SUCAP (Surface Combat Air Patrol):

This mission is normally assigned to the ASuW threat axis. Units assigned to this mission will launch and patrol their assigned zones. The will move to engage any identified surface threat detected along the ASuW threat axis.

This function should be assigned to aircraft with weapons capable of engaging enemy surface platforms. The most valuable use of this mission is with helicopters armed with anti-shipping weapons.

10.3.3.6 Assign Aircraft to Station menu

To assign aircraft to your mission, **select** them from the Aircraft column. Next, click **Assign** and a mini menu prompting you for how many of the selected aircraft to assign will be displayed; enter the proper **amount** and click **OK**. You will be returned to the Assigned aircraft menu.

Note that the selected aircraft now has "O/T Station" under the Assignment column instead of "Unassigned." This means that your aircraft has been successfully assigned to the mission. Continue clicking to finalize your assignment of aircraft if necessary. To delete an air patrol zone in the Formation Editor, select the unit and click the **Air Ops** button. The unit will then return to its base and the mission will be deleted.

10.3.3.6 Threat-Axes-Tracking Formation Editor Toolbar Button

This is perhaps one of the most advanced features of the Formation Editor as it allows you to set a threat axis to a contact you wish to track. This means as the contact moves, the threat axis (and units assigned to it) will move with it.

To activate the threat axis tracking button, click the **axis** you would like to assign to a particular contact. Ensure that the threat axis type matches the contact type you are wanting to track. Click your **tactical display window** and then double-click the **contact** you would like to track. Your axis is now locked on that target and will stay on it until you reassign or the target moves outside sensor range. If the target is lost, the axis will hold to the last known bearing of the target.

10.3.3.7 Detach Unit Formation Editor Toolbar Button

This unit detaches a selected unit from a group. Select the unit you wish to detach by clicking it in the formation editor window, and then click the Detach Unit button.

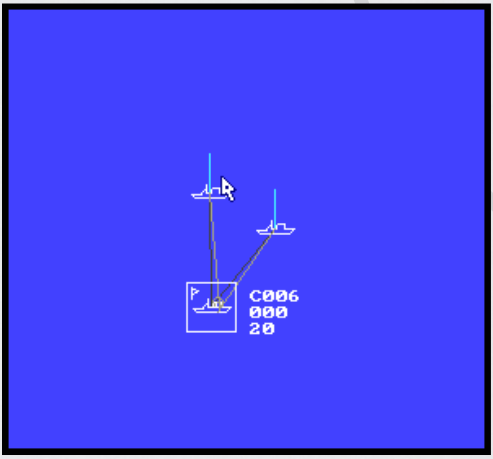
10.3.3.8 CPU Formation Editor Toolbar Button

This button allows you to set a unit of your formation to computer control. The Computer well then set appropriate zones and threat axes. The Computer will also gain control of all aviation units on that vessel. This is accomplished by selecting the unit and then depressing the CPU Button. To Remove CPU control you simply re-assign the stations and axes.

10.3.4 A Practical Example

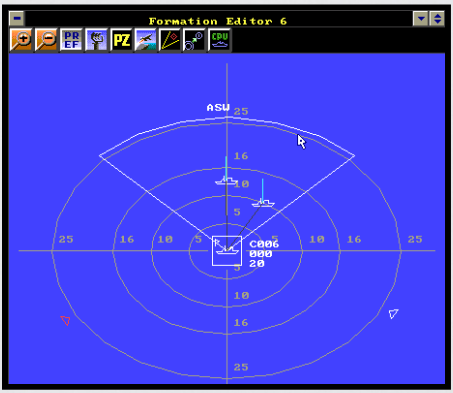
Now that you've got a good deal of familiarization with the interface, it is time to see a practical example. For this example, we shall build a small SSG (Surface Strike Group) consisting of a CG, DD, and an FFG. Given that this group will be tasked in an environment where any type of threat (AAW, ASW, ASuW) is possible, all three ships and embarked helicopters will be given a specific tasking in the

Formation Editor. We will assume that this is a coastal patrol with land to the east. Probable threats are air and surface from the east and submarine along the path of intended motion.



To start we have our CG centered and marked as flagship (note the little flag next to ship symbol) and is also selected (note the box around it). The DD is to the north and the FFG is to the northeast. You will notice the light blue lines protruding northward (0 degrees) from each ship; these are the PIM (Path of Intended Motion) lines. When building your formation, always orient in the direction your PIM lines are pointed. We will now build our formation by clicking, dragging, and releasing the FFG and DD onto the CG to make sure the CG is in the center of group.

Once we complete this procedure, we now have a formation built. As you can see, the symbology has changed to note this. The information to the right indicates that we have named the formation **SSG**, that it has a heading of **000** degrees, and that it has a speed of **0** knots. We have not yet issued orders to the formation in the Formation Editor or the Mission Editor, which is why these values are zero. This will change very shortly.

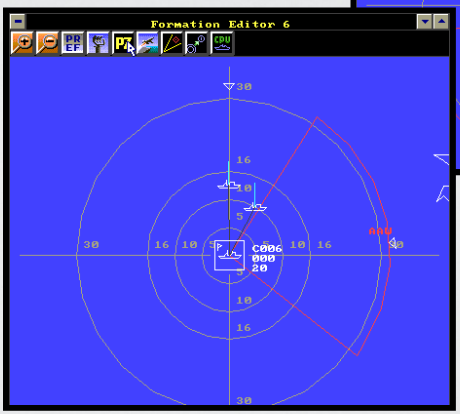


It is now time to delve into the Formation Editor. To activate it, click the **Formation Editor** toolbar button.

We have clicked on one of the units so all relevant information will be displayed. You will probably first notice the units we dropped in the first screenshot and that their positions have stayed the same. Also notice the circular plot which consists of four rings range marked in nautical miles.

The AAW threat axis is the currently visible threat axis (you can only view one at a time). To access the others, there are clickable marker triangles for the other axes. To access the ASuW axis, you would click the **white marker triangle** on the lower right portion of the screenshot. To access the ASW axis you would click the **blue marker triangle** at the top of the screenshot.

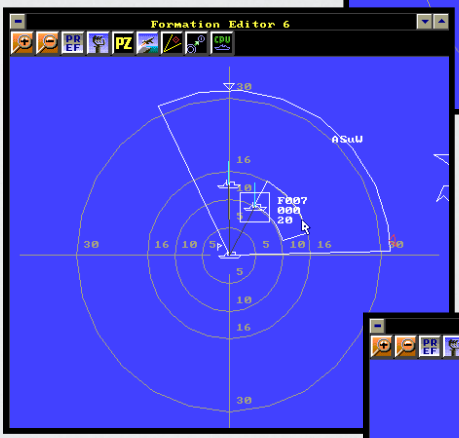
Now it's time to assign our first ship to an axis, so we must make some decisions and begin the process. We know that we will face all three types of threats in this scenario (AAW,ASW, and ASuW). We'll assign our CG to the AAW axis because its sensors and weapons seem most suited for this task. Looking over on the lower left side of the screen, we find the red AAW marker triangle and click it to bring the AAW axis into view. Knowing that our air threat is mostly likely going to come from the east , we click the cone and drag it to the right side of the scope.



Now that our AAW axis is swiveled over to the appropriate direction, we must decide where we'd like to position the patrol zone. Looking at the circular plot, you can see that the farther the patrol zone is from the center of the plot, the farther the ship must travel if I at some point we change the direction of the axis. For now, we'll play it safe and put the patrol zone closer to the center. Once we place this zone, it is locked in position within that axis. It is now time to create our patrol zone. To create our patrol zone, we follow these steps:

1. Click the ship assigned to the axis (ensuring a box is around it) and ensure the correct axis it will be assigned to is visible.

2. Click the **Patrol Zone Formation Editor** toolbar button and then click, drag, and release the zone to create. When we release, the **Select Station/Patrol Type** menu will be displayed with three options (**Station Keep**, **Sprint Drift**, and **Random**). Station Keep is the most appropriate in this case, so we'll select that and click **OK**. Our patrol zone now appears in the location we have selected; we can double-check this by noting that the color of the patrol zone matches the color of the axis it is assigned to. We have now successfully assigned the CG to the AAW axis. The screenshot above shows what this looks like when successful.



We'll now move on to assigning our other two ships to their appropriate missions.

Using the same procedure as above, we have assigned the FFG to the ASuW axis. We've oriented this axis towards the northeast as that is the direction we assume enemy surface forces will come from. If any are detected, the FFG will now move to engage them.

You will also notice that the red AAW marker triangle is now located on the right of the scope in the same position that we had moved the axis to. This is just a quick visual cue to remind the user where they had left an axis when not in view. We'll now move on the ASW axis.
Using the same procedure as above, we have now assigned the DD to a patrol zone on the ASW axis. The group's Path of Intended Motion is north, so that is where the ASW axis is locked. We have set a ASW patrol station about 10-15 nautical miles from the center of the group (and the CG we would like to protect) so as to hopefully detect, localize, and prosecute any submarine before it moves into torpedo range of the CG.

As mentioned before, setting ships to patrol stations on the ASW axis is the only Formation Editor related necessity to play the game. The axis is fixed on the Path of Intended Motion, so when you assign ships to patrol zones they will always stay in formation. So, if you are playing a game in which you do not wish to use the Formation Editor's features at all, you must at least enter once and set ASW patrol missions for each vessel.

We will now move on to the final lesson of this example – setting up an air patrol station within the Editor.

We'll assign an ASW helicopter from the DD to a Dipping Sonar air mission within a patrol zone in the ASW Axis. To accomplish this we complete the following:

1. Ensure that the appropriate axis is visible.

2. Click the **Air Ops** toolbar button and click, drag, and release the intended patrol zone.

3. The Select Station/Patrol Type menu is displayed; we select **Dipping Sonar** and click **OK**.

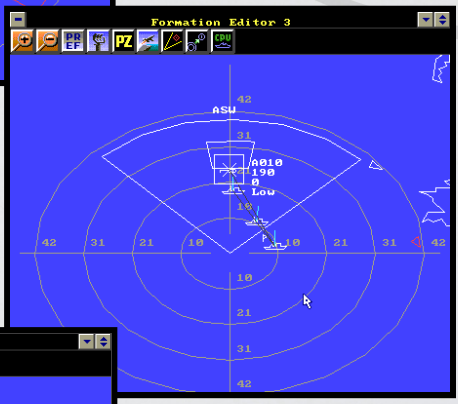
4. The Sensor menu is displayed; we'll set the unit to **active** to allow it to use its surface search radar to assist the group. Once we do this, the group's emissions condition will be reported as active because one radar is active. This is the only radar the enemy will see. We'll then click **OK** to confirm this selection.

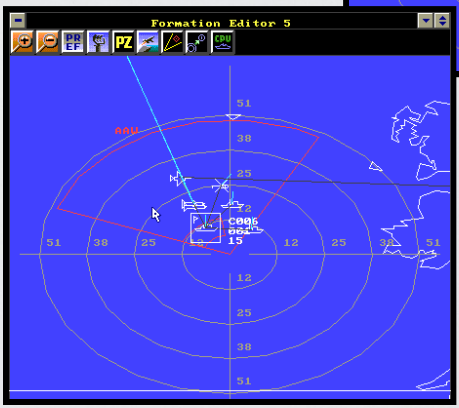
5. The Assign Aircraft To Station menu is displayed; we'll locate the helicopter which is hosted on the DD. We know this because the bottom portion of this menu gives us that information. Once located, we click **Assign**, enter **1** when asked how many, and click **OK**. We'll be returned to the Assign Aircraft To Station menu, and can confirm the mission is assigned because the helicopter's entry has been marked with "O/T Station" under the Assignment column. We'll click **Continue** and the helicopter's assignment will begin.

Aircraft that start on ships will not be visible until you run the simulation. Once this occurs, the aircraft should take off and immediately begin their patrol, provided they are ready. To be sure that the aircraft patrol zone has been assigned, simply select the aircraft from within the Formation Editor. When you do, you should see the patrol zone you have drawn and assigned it to; it should be the same color as the axis you have assigned it to.

We have now completed the Formation Editor assignments for this group. Let's see how we did by looking at two of the axes.

This is a screenshot of the final ASW axis. It is fixed to the Path of Intended Motion, so we cannot change it unless we change course of the group. Visually, we verify that the DD and helicopter we've assigned to it are within their patrol zones. The helicopter is selected so you can see that it has a drawn patrol zone and the color matches that of the axis it is assigned to, so it is correct. It appears thus far that we have successfully assigned our units in the Formation Editor. There is, however, one more check.





In this first screenshot of the AAW axis, we see that our CG is now within its defined patrol zone within the AAW axis. It appears we have successfully assigned it to a patrol zone within the AAW axis. However, it may be a good idea to double-check our work as well as give you a good visual example of the value of the Formation Editor. Let's say the ESM on our cruiser detects a distant air radar

contact to the northwest of our group. We'll quickly click the red triangle of the **AAW axis**, **drag**, and **drop it** in that direction.

As you can see, we have shifted the AAW axis and the ship has followed, taking up its assigned patrol zone within the new axis. It is now successfully engaging the detected aircraft, fulfilling its AAW role.

This is the value of the Formation Editor: by assigning platforms to patrol zones within defined threat axis at the beginning of a session, you are able to quickly access, change, and reorient to meet a threat with only a quick click and drag. You are now able to concentrate on more pressing issues, knowing that your groups are well managed by the AI per your orders.

11.0 Sensors

Sighted sub, sank same.
-AMM 1st Class Donald Francis Mason

Sensors are a key element in *Harpoon 3™*. Without them, your units would be unaware of their surroundings and quickly fall prey to the enemy. Sensors modeled in the game range from a pair of binoculars through to sophisticated radar sets, covering everything in between.

To change the sensor settings of a unit or group, select a **unit**, **group**, or **base** and click the **Sensor** toolbar button. Doing so will produce a small dialog window with several options, including Radars, Sonars, ECM and Comm Link. These sensors can be set to Active, Passive, or Intermittent. Below is a short description of the main sensor types.

11.1 Active Sensors

An active sensor is a radar or sonar that has been powered and is emitting either electric or sound energy. Active radar sends out an electronic pulse that is reflected off of a target and interpreted by the radar and displayed on the screen. The same is true for active sonar, which uses sound energy instead of electric energy in the pulse.

11.1.1 Radar

Radar locates objects by sending electromagnetic energy out into the atmosphere and receiving energy reflected back. Radar is mostly used for detecting aircraft and surface vessels; however, very sensitive "look down" radar types can be used to detect the periscope or snorkel of a submarine.

11.1.2 Active Sonar

Sonar makes use of the fact that water is a very good medium for sound propagation. Active sonar works in much the same way as radar. By sending out sound energy into water and analyzing what is reflected, it is possible to locate and even identify objects in the water. Warships are typically equipped with at least a basic sonar set, while submarines are generally given the most efficient sonar systems possible as they often have to rely on sonar as their sole means of situational awareness. Submarines rarely, if ever, use their active sonar, instead relying on their very sensitive passive sonar. Aircraft can be equipped with dipping sonars and sonobuoys, which are of variable efficiency and quality.

11.1.3 Electronic Counter-Measures (ECM)

ECM equipment can be used to degrade enemy sensors. Select **Active** from the Sensor dialog window to activate the ECM. Remember that in many cases using ECM will degrade your side's sensors as well. When a unit or group is being jammed, a small "X" will be displayed in the upper-right side of the unit or group symbol. If a unit or group on another side is using jammers, a small "Q" will appear in the upper-right side of the symbol for the unit or group using the jammer.

11.1.4 Communications

If you wish to cease datalinks and communications with your other units, you can turn your communications off. Turn them back on to re-establish communications.

11.2 Passive Sensors

11.2.1 Electronic Support Measures

Electronic Support Measures (ESM) work on the principle that the energy broadcasted by a radar emitter travels much further than the useful range of the radar set. These signals can be detected by a specialized receiver and analyzed by computers and electronic warfare technicians to provide information on the emissions received.

ESM sets are employed on nearly all modern military aircraft and warships, and range from basic radar warning receivers (RWR) which reveal only the presence of radar energy to extremely sophisticated ELINT (Electronic Intelligence) systems, which can interpret the emissions received to not only show the presence of an emitter, but also it's exact location and type. If a detection is made by ESM, the contact will be displayed as an "ESM cut" on the map as a line or wedge radiating from the detecting platform in the direction of the contact. The location of the contact is somewhere on the line or within the area represented by the wedge.

A unit symbol will appear in the center of the ESM cut; this is not the exact location of the contact. As a contact is solidified, the area or line representing the ESM cut will decrease and the contact symbol will be closer to its exact location. Selecting the **contact** and clicking the **Report** button will list the type of emission being detected.

11.2.2 Passive Sonar

Passive sonar listens to the ocean attempting to detect the sound of an enemy ship or sub (engine screw noise, active sonar, etc.). Many ships and subs have both a hull-mounted and a towed sonar array (comprised of very sensitive microphones). The quality and range of passive sonar is affected by noise in the water. If a ship or sub using passive sonar is moving through the water at a high speed, the quality and range of its passive sonar is diminished by the noise created by moving through the water. In *Harpoon 3™*, passive sonar is always turned **on** for platforms that are so equipped

11.3 Intermittent Setting

When **Intermittent** is selected, the sensor will become active for a certain duration and then passive for a certain duration. Numerical values are entered to determine the active sensor duration and its variance and the passive sensor duration along with its variance.

If for example you enter a value of 10 for passive, a % variance (for passive) of 50, a value of 20 for active, and a % variance (for active) of 75, the sensor will be active for 10 minutes plus or minus 50% (or, 5-15 min.) and then will go passive for 20 minutes plus or minus 75% (or, 5-35 min.). Once the sensor has been active once and then passive once, the AI generates another number randomly within the range for each and begins the cycle again.

11.4 Other Sensors

11.4.1 Sonobuoys

Anti-submarine aircraft, both fixed-wing and helicopters, use sonobuoys to detect submarines. Sonobuoys are dropped in the water from the aircraft and transmit to the aircraft what they sense in the water. There are basically two types of sonobuoys: active and passive. A passive sonobuoy listens to the ocean and transmits any passive detections it makes directly to the aircraft. An active sonobuoy remains passive until it is turned on.

To turn on an active sonobuoy, **select** it and then click the **Sensor** toolbar button. Set the Sonar selection to **Active**. Sonobuoys have a service life and will eventually cease to function and sink. The three most common types of sonobuoys used in *Harpoon 3™* are:

- **DIFAR:** A passive sonobuoy that provides directional information on a contact. A contact will appear in an uncertainty region in the direction it is located from the DIFAR.
- **DICASS:** Both a passive and active capable sonobuoy. This sonobuoy provides directional information when passive and both directional and range information when active. A passive contact will appear in an uncertainty region in the direction it is located from the DICASS. A contact made with the active setting will appear with range and directional information.
- **LOFAR:** A passive sonobuoy that only indicates a detection has been made within its passive sensor range. No range or directional information is provided on a contact. A contact will appear with an uncertainty region around it when detected by a LOFAR.

11.4.2 Dipping Sonar

Some ASW helicopters have a dipping sonar capability. A dipping sonar is a sonar set that is dipped into the ocean from a hovering helicopter and activated. A contact will appear with both directional and range information. Dipping Sonar is deployed automatically by equipped ASW helicopters that are operating on an assigned mission or as part of a formation air patrol.

To manually deploy Dipping Sonar, set the helicopter to hover at Very Low (**VLow**) altitude, press the **Sensor toolbar button,** and select the **Active** sonar selection.

12.0 Notes on Weapons and Ordinance

Put your trust in God, but keep your powder dry.
-Oliver Cromwell

Here are some insights into how various weapons and ordnance are being employed in *Harpoon 3™*.

One of the trickiest pieces of modeling we did in *Harpoon 3™* was the employment of semi-active radar homing missiles (SARH) which, due to engagement geometry, were forced to share illuminators. It was a simple enough problem when confined to illuminate-all-the-way missiles, but several real missile systems had inertial/command guided fly out and only required illumination in the terminal phase of their flight. This meant we had to keep track of when each director would be busy (in the future) and prevent a missile from firing if no directors would be available at the intercept time.

So, each director/illuminator received a rolling bit field representing a 15-second engagement time slice and we wrote a simple timesharing system to keep the launchers honest. When you also consider that each mount has a rate-of-fire (ROF) cycle and finite reload time, the whole affair has suddenly grown beyond the user's ability to effectively micromanage. In real life, a trained Air Warfare Officer and his crew will have a very hard time keeping up with the multi-dimensional geometry of even the simplest engagements. Since the average *Harpoon 3™* user would probably have even less training, we had to let the computer handle a lot of the functionality for them. The design paradigm of *Harpoon 3™* states clearly that "Once the missiles start to fly, the user is mostly out of the loop." While this may be less fun than shooting each missile yourself (*a la* most flight simulators), the emphasis is really on learning about and employing modern naval tactics and not how quick your mouse hand reflexes are.

In real life, a SARH missile tracks reflected microwave energy that has bounced off its intended target. This energy usually originates from an 'illuminator'. An illuminator is a generally a radar emitter that produces a tight microwave beam used to guide a SARH missile.

A typical missile engagement using SARH missiles would probably go like this: A search radar will detect a target and tell the illuminator where to point. The illuminator then emits a microwave beam which reaches out to the target. Some of the energy bounces off the target and is visible to the radar seeker head in the missile (which is still on the rails). The missile says to the fire control computers "I can see the reflected energy." The missile is fired towards the target and will steer itself towards the reflected energy, eventually intercepting the target and exploding. If the illuminator is turned off for some reason, the missile will no longer see any reflected energy and will miss the target. Some missiles will self-destruct when they lose their illumination. There are some problems with this system. First, the illuminator must be constantly pointed at the target during the entire flight of the outbound missile. This means you may only shoot at as many targets as you have directors to guide them.

Some missiles and torpedoes employ search patterns in the terminal phase of delivery. This means if they do not see an appropriate target when they have reached their activation point, they will alter their course to search for one. Missiles and sub-launched torpedoes will initiate an expanding 'snake' pattern. A snake pattern simply zigzags back and forth every few minutes by about 45 degrees left and right of its base course. In contrast, aerial delivered torpedoes launched at uncertain submarine contacts will almost always begin an expanding circle pattern (a spiral), occasionally changing depths in its search for a submarine. Care must be taken not to launch at an uncertain target in an area where friendly or neutral platforms might be spotted by the weapon's seeker head. The weapon cannot tell friend from foe or combatant from civilian and will engage any platform matching its target parameters.

Air-delivered gravity bombs may be tossed ballistically. This simply means that the higher and faster an aircraft is flying, the greater the distance from the target the bomb can be released. This allows aircraft to avoid heavy concentrations of point defense weapons (like handheld SAM launchers and small arms fire).

FOR MORE NOTES ON WEAPONS, REFER TO SECTION 26M2M

13.0 Weather

Admiral Clark addressed the Naval War College on June 12, 2002…In this address, he explained that the United States Navy must build upon its strengths, thus enabling an asymmetric war fighting advantage over its adversaries. One of these strengths is the Navy's ability to apply Oceanography to its battle problems and challenges in order to leverage the environment for an advantage.
-U.S. Naval Meteorology and Oceanography Command

The weather model in *Harpoon 3™* is more complex than might appear on the surface. When a scenario is first created, the weather model is run on its map. This generates a set of low and high pressure cells based on a set of environmental rules. The map itself has a set of meteorological information that represents the base values for the map region and season depicted by the scenario. When the game is run, these low and high pressure cells interact with the base values present on the map, producing pressure changes and thus cell "movement" across the map. The interaction of these cells produces boundary effects along their edges, including various types of cloud cover and precipitation. The relative movement of these pressure cells also generates wind speeds, which affect the sea state for that area.

One of the most important things about weather in *Harpoon 3™* is its effect on sensor performance. Radar and other electromagnetic sensors (including eyes) are affected appropriately by precipitation and visibility levels. Sea State is another example; it has a terrific effect on sonar performance, both passive and active. Sea State is a general measure of ocean conditions, both in terms of wind speed and wave height, and is represented by a number from 0 to 9. A Sea State value of 1 would represent a light breeze with flat, calm (maybe rippled) seas, while a value of 9 indicates almost fifty foot waves and wind strength of over sixty-five knots! Each increase in Sea State reduces passive sonar ranges by about 15%, depending on the operating frequency of the sonar. High and medium frequency sonars are affected more severely than low frequencies. Active sonars are affected even more by Sea State. Rough seas tend to fill the ocean with tiny air bubbles, even at great depths. Since air bubbles reflect sound, the reverb effects make active sonar almost useless above Sea State 5. A similar effect can be demonstrated by turning on your automobile high-beam lights in a dense fog bank.

14.0 Order of Engagement

This ship is built to fight. You had better know how.
-Admiral Arleigh Burke

If you have developed a flawless plan, which the enemy resolutely cooperates with, then the topic of this section is moot. You will already be engaging the enemy in the order desired. The frequency of this occurrence, however, is too infinitesimal to be measured. As stated previously, war is a dynamic process. As such, you must be capable of altering the existing battle plan on the fly and redefining the order of engagement instantaneously. To do so, you must evaluate the threat of each new contact in terms of potency and immediacy.

Potent threats are those forces which, if left unchecked, are capable of precluding mission accomplishment. Naturally, there are varying degrees of potency within this grouping. Some units may be eminently capable of executing the threat, others only noteworthy on a good day with a lot of luck.

Either way, it is the commander's task to examine every new contact against the enemy OOB and assess the degree of threat it offers to friendly forces. Immediate threats may or may not be capable of precluding mission accomplishment, but they do pose a clear and immediate danger to friendly forces, usually stemming from the fact that they have already attained weapons launch positions.

Remembering that the commander has already been cautioned to know the enemy, platform specific guidance as to the level of threat will not be presented here. Indeed, the number of variables inherent in such an analysis would require volumes for all the ships, aircraft and submarines depicted in *Harpoon 3™*. Instead, the player should employ their knowledge of sensors and weapons ranges to categorize each contact within the following threat class hierarchy:

Class A: Potent and Immediate
This represents a threat of the highest order, requiring all personnel to immediately drop what they are doing and respond immediately as needed. This type of threat is a great danger to the ship, and can include anything from multiple inbound sea-skimming anti-ship missiles to a spy trawler shadowing the ship or fleet.

Class B: Immediate Only
This classifies threats that, while dangerous, do not pose an immediate impediment to the current mission. However, they still should be dealt with quickly. These types of threats can include the discovery of an unknown light airplane or small boat approaching the fleet. One should prosecute them without pulling assets off the main tasks at hand, if possible.

Class C: Potent Only
This type of threat poses no immediate danger, but has potential to elevate to a higher Class level. In this category, there is some time to gather the necessary elements to conduct a strike against this threat, or if it is determined to be too powerful, to avoid it entirely.

Class D: Neither Potent Nor Immediate
This type of threat essentially covers everything else, and are considered to both not be a danger nor a mission-critical target. These are considered to be 'targets of opportunity,' which may or may not be worth expending resources against; this is up to the commander based on their current situation.

Please note that firepower is not the only criterion for threat classification. An ocean-going tug can be a class "A" threat if it is providing targeting data to one or more shooters somewhere over the horizon. Similar concerns must be exhibited with flag merchants of the hostile nation. Remember to assess enemy capabilities rather than intentions.

15.0 Formation and Stationing Considerations

There are only two absolute rules of thumb at sea: Don't let the people in the water tank, and don't let the water in the people tank.
-Unknown Sailor

15.1 Dispersal vs. Concentration

Once the Path of Intended Motion (PIM) is established, the commander must determine the general disposition of the force. Naval warfare differs from its ground counterpart in this respect, because the geographic proximity of unit placement is a function of defensive strength versus offensive strength. Thanks to passive targeting and over-the-horizon missile capability, it is no longer necessary to form a line of battle to concentrate force on the enemy. With proper command and control, widely dispersed units can put their missiles on target within seconds of one another, as evidenced in Operation Desert Storm. These same units, however, are less capable of defending themselves as individuals when compared to their ability to support one another in a well-designed formation with overlapping missile coverage. Given that condition, you would expect the use of supporting defensive formations to serve inferior and superior force equally well. Reality does not bear this out, however, and the use of defensive formations is actually more critical for the superior force. Consider the rationale that supports this conclusion by examining the following hypothetical conflict between big water navy Blue and coastal nation Orange.

Blue sacrifices superiority if their forces are divided such that they might be engaged piecemeal. Yet, by massing the forces to support one another defensively, Blue simplifies Orange's targeting once the force is located. Orange is better off to disperse their units in the face of Blues superiority. Why? This dispersal forces Blue to detect, classify, and engage each individual element of the Orange force, which precludes simultaneous action against all of them. While the first elements are being engaged, Orange is buying time to get his other units into position to conduct a coordinated offensive strike against the Blue Force.

By adding names to the faces, astute players will note that the classic example of the aforementioned discussion is the war that never was. U.S. wargames focused on how they would use CV Task Forces to project power on the Soviet mainland, while their Soviet counterparts built their bastion concept around the very approach illustrated for the inferior player. The lesson to learn and apply in all mission planning, regardless of the nationalities involved, is that unit concentration universally favors the superior side and dispersal is the tactic of choice when outnumbered or outgunned.

15.2 The Threat Axis

The threat axis is the commander's estimate of the likely direction from which an attack can originate. The threat axis always exists, whether it applies to a single unit or a group of units, but it is really most significant in formation planning for groups. Although this sounds simple to understand, there are nuances to the establishment and operational use of a threat axis that must be clarified from the outset to alleviate later confusion.

15.3 Force Composition

The major factors in determining station assignments in a formation, other than the location of the threat axis, are the capabilities of the platforms themselves. Although virtually all modern ship designs emphasize multi-mission capability (i.e.: the ability to conduct AAW, ASW, and ASuW), the reality is that each class has a specialty within the three warfare areas and some limited ability to conduct the other missions. Commanders must analyze their force mix and categorize ships accordingly before proceeding deeper into stationing considerations. Because of the aforementioned emphasis on the defensive nature of formations, and the knowledge that ASuW is primarily offensive in nature, this categorization should focus on AAW and ASW abilities.

15.4 Formation Structure

A formation is a method of layered defense. Picket ships, Combat Air Patrol (CAP), and Airborne Early Warning (AEW) aircraft provide surveillance to 200 nm and beyond. The outer screen typically occupies sectors between 12 and 24 nm from the main body. The inner screen is stationed within visual contact of the High-Value Units (HVUs), usually under 10 nm from the formation center.

Since the employment of detached action groups (such as surface action groups and surface action units or picket ships) are specialized tactics, the placement of these assets will be excluded from this discussion. The circumstances for their use, as well as the proper stationing in relation to the threat axis, will be addressed in the appropriate warfare section of this manual. At this stage, it is important for the commander to focus exclusively on the functions of the inner and outer screens. Standard placement of the High Value Unit(s) in the center of the screen is assumed.

15.5 The Outer Screen

The function of the outer screen is to detect and engage any units that have leaked through the pickets and threaten the main body. To accomplish this mission, the outer screen must be capable of performing in all the mission areas. ASuW is a given, so the composition of the outer screen should be equally capable in the other mission areas, skewing any advantage toward ASW. Also, the ASW platforms chosen for the outer screen should have the best passive sonar detection suites and the capability for stand off engagement of contacts with helicopter assets.

ASW assets are more effective in the outer screen because their separation from the ambient noise generated by the main body is critical to passive detection of submarines. Also, because the sizes of the sectors in the outer screen are so much larger, ASW assets can sprint to the forward corner of their area and drift at bare steerage back through the sector. Their vulnerability is increased while sprinting, but they are extremely effective on the return leg. A ship like a Spruance with a towed array sonar, operating at five knots or less, is virtually undetectable to submarines.

AAW assets are present in the outer screen for two reasons: to provide covering fire for the relatively vulnerable ASW platforms, and to engage short range ASuW missile equipped aircraft before they reach their launch points against main body assets. In evaluating platforms for this role, maximum effective range of the SAM battery is more important than salvo rate. Aircraft are slower than missiles, and by employing greater range missiles, the outer screen AAW asset can conduct more engagements within the fixed amount of battle space. The more engagements, the greater chance the strike will jettison ordnance and go home.

15.6 The Inner Screen

ASW units selected for the inner screen should have the best active sonar suites to allow for delousing (combing the area beneath the HVU) and an immediate targeting solution on any contacts that have penetrated the outer screen. Helicopter capability is important, but only if two or more inner screen assets are helo-capable. This restriction is due again to the need for immediate and decisive action, which negates the effectiveness of a helicopter asset chocked and chained to the deck. With one helo always in the air in an ASW configuration, the commander can use it to "pounce" on any contacts generated by the inner screen.

The emphasis for assignment of AAW assets to the inner screen should be rate of fire, rather than range. It is assumed that any air contacts penetrating to the inner screen will be missiles. As such, they will be traveling faster than the platforms that launched them and there will be more of them as well, as each aircraft generally launches more than one missile. The more defensive firepower you can put in the air, the more inbound missiles will be attrited, and the smaller the burden of point defense systems like Phalanx becomes.

Aegis is the premier AAW suite for inner screen defense because of its all-aspect engagement ability and lack of launcher limitation for Vertical Launch-equipped Systems (VLS). Because of this fact, no modern U.S. CVBG puts to sea without a VLS cruiser tethered on a 4,000-yard leash to the carrier. Cruiser skippers who were used to the relative independence of picket duty prickle at the current situation, but it is a reality of modern tactical doctrine.

16.0 Electronic Battlefield

No matter how enmeshed a commander becomes in the elaboration of his own thoughts, it is sometimes necessary to take the enemy into account.
-Sir Winston Churchill

16.1 Electronic Scouting

Any serious student of military history will point out countless examples of how technological improvements have driven changes in tactics. Throughout it all, however, the commander's prime ob-

jective of delivering firepower in support of the mission has remained unchanged. Further, in order to accomplish this objective, the commander must still locate the enemy, track him, and target him. The effort to do so involves all methods of surveillance, from visual sighting to electronic intercept of emissions, known collectively as scouting. Scouting involves gathering data, both active and passive, from all friendly forces for use by the tactical commander. The degree of effectiveness of scouting is a function of the area covered per unit of time. Command and Control functions, for the purpose of this discussion, are those which allow the commander to correlate scouting information on enemy force strength and disposition and disseminate that information to his own forces for exploitation in a battle plan.

As technological improvements have driven the envelope of engagement from the visual horizon out to 600nm, the scouting problem has been complicated exponentially. Why? Simply because of the increased area that must be covered for the commander to feel safe that any units within striking distance have been discovered. Also, because of the increasing lethality of weaponry, the Battle of the First Salvo is a realistic consideration. The commander who finds the enemy first and gets off an effective attack, while precluding the opponent from doing the same, will ultimately succeed. As such, the electronic battlefield, once referred to as the battle of the airwaves, holds the key to victory.

16.2 The Electronic Warfare Triad

Electronic Warfare (EW) is actually composed of three distinct subsets: Electronic Support Measures (ESM), Electronic CounterMeasures (ECM) and Electronic Counter-CounterMeasures (ECCM). All legs of the triad are modeled in *Harpoon 3™*, but the commander will have varying degrees of control over each portion. ESM will afford the greatest degree of user specified doctrine, while ECM offers a lesser degree of selectability, and ECCM efforts are modeled almost exclusively within the algorithms which control combat resolution. It is assumed that forces will employ all ECCM capabilities they possess, so the results of these efforts will be displayed automatically without user intervention.

16.3 ESM

ESM involves the passive reception of enemy electromagnetic emissions. By processing these emissions against a database of known emissions, and comparing the frequency, pulse repetition rate and other details too extensive to cover here, modern ESM suites like the SLQ-32 are capable of identifying the class of emitter which produced the transmissions. Some emitters are unique to a single class of ship, aircraft, or submarine; as soon as that emitter is detected, the commander will be able to classify the threat exactly. Most emitters, however, are carried on numerous platforms. As such, a single emission may only produce a list of possibilities as to the originating platform. When this occurs, prudent commanders must assume the worst possible case of all the potential threats.

Subsequent emissions of other radar types from the same bearing may allow one to narrow the list of possible threats, by excluding those platforms which do not have both emitter types, but formations of many vessels may still make this evaluation unreliable. Indeed, it is possible for far-sighted commanders to radiate emitters on two separate ships in proximity, possibly leading the enemy to believe a third, stronger vessel is present.

A unit which radiates, and is subsequently classified by the enemy, is not necessarily targeted or even located with any degree of certainty. If a single unit in the force receives the transmission, a line of bearing to the source is generated. If multiple units in the force receive the intercept, they may correlate their bearings to define an ellipse known as the area of probability, within which the radiating unit must be.

This technique is known as passive cross-fixing. See Figure 3. The greater the physical separation between the units coordinating for the passive cross fix, the greater their bearing separation will be and the more accurate and narrow the area of probability.

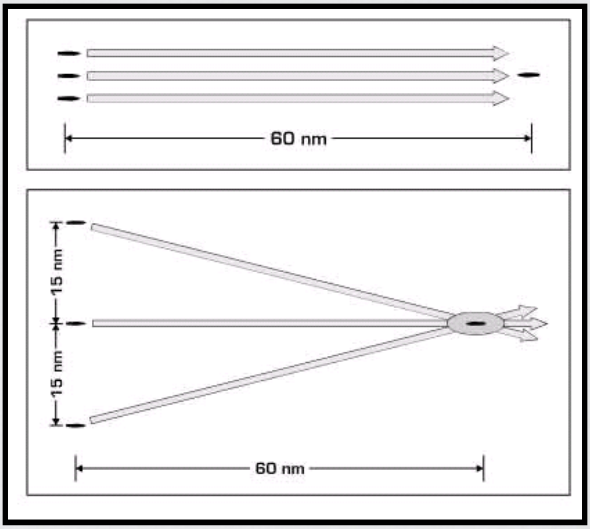


Figure 3: The effect of geographic separation on generation ESM cross-fixes.

One thing should be readily apparent already: for ESM efforts to be effective, the enemy must co-operate by radiating their emitters. Given the potentially deadly effect of a passive, over-the-horizon missile attack in which the first warning is illumination by missile seeker heads in their terminal phase of flight, one might reasonably question if it is ever worthwhile to radiate and risk this possibility. The answer is yes, but radiating must be done when it is tactically advisable to do so and avoided when it is not. As the battlefield is a dynamic environment, the situations which dictate changes in emission posture are also fluid. As such, a thorough understanding of subsequent material in this section is essential to success in *Harpoon 3™*.

16.4 Detectability vs. Survivability

The manner in which commanders determine who may radiate, and under what circumstances, is known as the EMissions CONtrol (EMCON) posture. The tactical commander, even in periods of unrestricted emissions, must consider the impact of that decision in terms of the targeting data provided any potential adversary. In the U.S. Navy, EMCON posture is typically generalized in operations orders as follows.

Emission Control Conditions:

- **EMCON A** – No Emissions
- **EMCON B** – Limited Emissions
- **EMCON C** – Unrestricted Emissions

It is important to understand, however, that different components of a force may be in different EMCON conditions. Consider a carrier battle group (CVBG), for example, that desires to remain untargeted but wants a good surface picture out to 250nm. The task force commander may opt to keep the surface units of the task force in EMCON Alpha, while launching an E-2C to conduct an active surface search. If the E-2C is detected by enemy forces, its presence will denote that a carrier is somewhere within the area of operations, but the enemy will be denied specific targeting data on the location of the carrier as long as the E-2 is not radiating, on the deck (flying very close to the surface), or in close proximity to its parent.

This example brings up the common problems with the quality of information obtained through ESM. The quality of an ESM fix is directly related to the separation of the detecting units, as denoted in earlier in Figure 3, and the duration of the enemy emissions. The longer the enemy complies by radiating, the higher quality fix one may obtain. In general, the following classifications are applied to ESM fixes.

Classification of ESM Fixes:

- **Detected** — The unit has emitted long enough that its presence is known, but it cannot be attacked with any degree of certainty.
- **Tracking** – The unit has emitted long enough for opposing forces to establish and area of probability and possible course and speed. Attack is possible but with a decreased chance of success due to the degree of uncertainty.
- **Targeted** – The units position, course and speed are known. Detecting units may attack at will.

Commanders must realize that the enemy seeks to target them in the same fashion. As a result, determination of an active or passive posture falls to other considerations.

16.5 Inferiority vs. Superiority

Consider the earlier example of an inferior vs. a superior force. In that discussion, we determined that a superior naval force should mass to provide mutual defensive support, while an inferior force should disperse, both to divide the offensive capability of the opponent and to increase survivability of the remaining assets until they reach firing positions. Examining that model in terms of EMCON posture might lead one to conclude that logic would lead the superior force to radiate without restriction and the inferior force to favor stealth and surprise.

Taking the place of the superior force commander, hereafter referred to as Orange, your defenses are massed, but they are only effective if any incoming enemy raid is detected. This would mean that the defensive posture adopted by a close formation is only effective if one elects to do so, then the dispersed adversary, which we will call Blue, has a geographical separation which makes passive cross fixing very effective, and he may conduct a coordinated first strike, which could prove decisive. Conversely, if Blue is denied targeting data because Orange remains in a strict EMCON Alpha con-

figuration, he may be forced to conduct an active search, which could lead to defeat in detail of his dispersed assets by Orange's massing of force.

Herein lies the tactical dilemma faced by all naval commanders. The struggle to obtain a targeting solution must be weighed against the enemy's ability to do the same. The answer lies in your estimate of whether or not he has already been detected. As the superior force commander, if you have reason to believe that you are undetected and, more importantly, untargeted by the enemy, then you should continue to pursue offensive operations against them without hesitation. If, however, you are reasonably certain that your position is known, a shift to active emissions is necessary to increase survivability.

16.6 ECM

Electronic Counter Measures (ECM) involves all techniques designed to deny the enemy specific targeting data. Some of these techniques are actually mechanical, such as Chaff and Soids, but they are classified within this subset of warfare nonetheless. ECM can be both offensive and defensive, and the fluent tactical commander must understand the role of each.

Chaff canisters contain thousands of thin metal strips which are exploded into a cloud after deployment from the firing ship. These strips fall slowly to the ocean, drifting with the wind and expanding as they do to provide a large, reflective radar signature to active missile seeker heads. Chaff may be employed as either a deceptive or seductive countermeasure. To act as a deception, it must be deployed prior to the launch of the inbound missile group, so that more targets appear than actually exist. (See Figure 4.) Once missiles have been launched, however, chaff clouds only exist to seduce missile seeker heads away from their eventual target. (See Figure 5) Soids, which are floating flares, are only effective in the terminal phase of missiles with infrared signature seeker heads.

IN HARPOON 3™ THE EMPLOYMENT OF CHAFF AND SOIDS ARE AUTOMATIC FUNCB TIONS WHICH REDUCE THE EFFECTIVENESS OF INBOUND MISSILE GROUPSM HOWB EVERL THESE ARE POINT DEFENSE SYSTEMS AND CANNOT BE LAUNCHED IN ANY OTHER MODEM

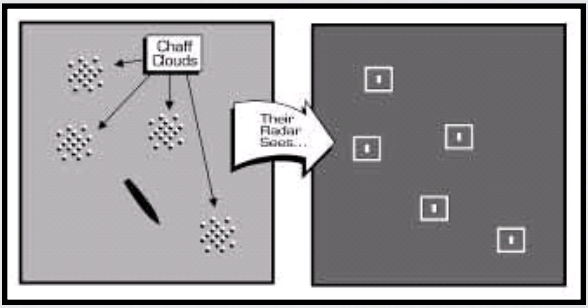


Figure 4: Deceptive Chaff- One ship surrounded by Chaff Clouds which the enemy sensor detects as multiple ships.

Offensive ECM involves the use of jamming in support of strike operations to preclude the enemy from determining the composition of the strike and targeting specific elements with counter-battery fire. In *Harpoon 3™*, the player will note that inbound air strikes escorted by ECM-capable assets appear only as electronic noise on their tactical displays. This denies targeting of the missile-equipped strike aircraft until the jamming platform is destroyed. Further, a savvy tactical opponent will strike from several directions, complicating the AAW effort with jamming decoy groups and chaff corridors. The *Harpoon 3™* commander will also be able to employ ECM in strike planning.

Defensive ECM includes the employment of Blip Enhancement, Chaff, Soids, and jamming of terminal homers. Blip enhancement is a selectable tactic employed by properly equipped helicopters to produce a radar signature equivalent to an aircraft carrier for missile terminal seeker heads. Similarly, Chaff and Soids are employed to provide larger, more attractive targets to missile seekers than their real world counterparts. Eliminating a missile through any of these countermeasures is termed a "soft kill", as opposed to a "hard kill" in the form of a traditional intercept.

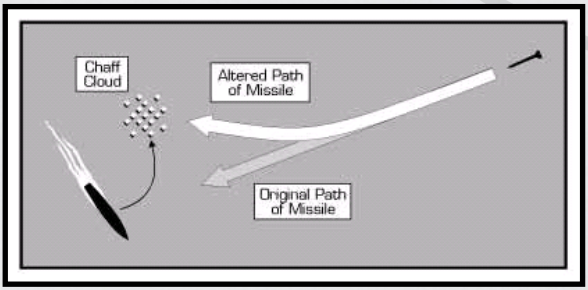


Figure 5: Seductive Chaff: The ship has been locked on to by a missile seeker head, so if fires a seductive chaff cloud which draws the missile away.

16.7 ECCM

Electronic Counter-Counter Measures (ECCM) involve manipulative techniques designed to seduce a missile seeker head that has locked-on away from its intended target and toward an imaginary target at another point in space. The use of this and most other defensive ECM functions are handled internally in the *Harpoon 3™* tactical model.

16.8 Command & Control

Communications transmissions are also electromagnetic emissions subject to detection and exploitation by the enemy. Again, however, some types of transmissions are more detectable than others. Data links, which are used extensively by U.S. Forces, are line of sight transmissions that are virtually undetectable unless an enemy unit is between the transmitting and receiving units. In *Harpoon 3™*, data links are modeled as connecting webs of lines between the units in contact. Only one unit, such as the E-2C used in the earlier example, may be radiating and therefore targetable by the enemy, but all units connected to the web are capable of using the targeting data provided by the link for any subsequent attack.

Satellite communications, because they are also directional in nature, are difficult to intercept. Traditional radio frequencies, such as UHF, VHF and HF are progressively more susceptible to intercept, and HF transmissions have been localized from thousands of miles away. As a result, the prudent commander must balance the need to disseminate targeting data to his forces with the corresponding intelligence he reveals to the enemy in his method of doing so.

17.0 Submarine Warfare

Of all the branches of men in the forces there is none which shows more devotion and faces grimmer perils than the submariners.
-Sir Winston Churchill

17.1 Commanding Submarines

"The San Luis was at sea, and at times in the area of the British force, for an estimated 36 days. The threat from the Argentine submarine was a continuous concern for the British Task force commander, and numerous attacks were made against suspected submarine contacts, with a large number of ASW weapons being expended. In any event, San Luis survived all British ASW efforts."
-From the briefing prepared for the Secretary of the Navy, The South Atlantic Conflict Lessons Learned

What the *Harpoon 3™* commander should garner from this observation on the Falklands War is not only that ASW is difficult, which should already be internalized, but that a single undetected submarine can complicate the battle plans of the adversary considerably. Also, similar to mine warfare, the suspicion of the threat is sufficient to force the commander to commit large numbers of resources to eradicating it, resources which would otherwise be available to support his primary mission.

Thus far, the focus of this guide has been on countering the submarine threat to your own force. In this section, we will reverse tack and become the threat. By learning the optimum employment of submarines from a commander's perspective, one will not only possess a potent new force multiplier, one will also gain further insight into how enemies will attempt to use this platform to advantage.

17.1.1 Out of Sight, but Not Out of Mind

The first major leap of faith required of those who will utilize subs on the battlefield is that they cannot be micro-managed to the degree that other forces are. Although earlier releases of *Harpoon* allowed the commander to issue orders to submarines whenever the mood struck, this is inconsistent with real-world constraints. For submarines to be in constant communication, they would have to remain at periscope depth all of the time with their communications mast raised. Naturally, such a posture would eliminate virtually all of the tactical advantages a submarine possesses. The trade off in letting a submarine remain out of touch and therefore stealthy is in not being aware of the sub's activities at all times. The most important thing to understand is that, in the case of missions with extended durations, the commander will not know for certain until the battle is over if the sub is still active; the only indication will be the loss of contact. After the scenario ends, casualties will be updated to reflect actual losses of friendly submarines.

17.1.2 The Special Case: SSNDS

In some instances, a commander will have a submarine in direct support of a task force (or, SSNDS). This asset is usually stationed in a distant sector on the Formation Editor as an ASW barrier patrol.

Because of special communications gear contained in the active sonar suites of surface ships, submarines operating directly with the battle group may be alerted to come to communications depth at any time. Again, if the submarine skipper is not in contact with an enemy sub (which would now be alerted to the presence of the friendly, if not its precise location), he will come to periscope depth for communication. There is a delay based on the actual time it takes to change depths, but once the sub is there the commander may alter the rules of engagement (ROE), mission tasking, and movement orders as above.

BECAUSE THE SPECIAL SONAR TRANSMISSION USED TO CALL SSNDS ASSETS TO THE SURFACE IS RECOGNIZABLE TO THE ENEMYL IT IS SOMETIMES BENEFICIAL FOR A COMMANDER WITHOUT AN SSNDS ASSET TO RADIATE IT ANYWAYL MAKING ANY ENEMY SUBS IN THE AREA THINK ANOTHER SUB IS PRESENTM

17.1.3 Submarine Missions

Excluding SSNDS, most missions assigned to submarines reflect their ability to operate independently and respect their ability to strike effectively without additional guidance. As such, the prudent commander will consider the need for stealth and surprise and capitalize upon the strengths of submarines in mission planning without placing them in unwarranted risk.

Prior to the commencement of hostilities, submarines should be the platform of choice to conduct reconnaissance of enemy strength and disposition, as well as conduct offensive operations like the mining of enemy sortie routes. From this inshore position, these same submarines can act as back-up for their minefields, conducting follow-up attacks on enemy assets transiting the area. Also, if the sub is missile equipped, these same submarines can either conduct preemptive strikes on enemy airfields or ports, or lay in wait to strike in conjunction with air elements of the main task force.

Additionally, when the enemy has limited ASW capability, as is the case with many coastal nations, a submarine may be positioned close ashore with its periscope raised to report the movements of enemy air groups coming offshore against the main force. This is a new method of passive airborne early warning that has been used with success by Sixth Fleet assets in the Mediterranean. Also, as a scout, submarines can provide ESM cross fixes and visual surface searches from their area of operations. The latter can be critical in monitoring traffic through congested areas like straits and narrows and identifying contacts of interest to preclude fire on neutrals. Finally, submarines are also capable of performing battle damage assessment when used in conjunction with other forces in a joint attack.

With hostilities in progress, submarines may be used in their traditional role of hunter-killers. Submarines are the most effective platforms at locating and destroying enemy submarines, so they should be considered for all ASW plans. Do not discount the diesel-powered submarines; the Batfish located and destroyed 3 of 4 Japanese submarines operating around the Philippines in as many days in WWII. Modern diesel boats are much more capable than their predecessors and are a match for the most capable SSNs if handled properly. Also, submarines may seek and destroy enemy warships or cripple the war effort of the adversary by pursuing a *Guerre de Course*. A commerce war on merchants and auxiliaries is a great fear of western nations, as these assets are in much shorter supply than during WWII, when Nazi U-boats almost succeeded in breaking the Allied back in the North Atlantic.

"If we would have had more U-boats, we would have won the war!"
-Admiral Doenitz, Commander of the German submarine forces in WWII from his book, The Modern Diesel Boat

Though some analysts would point to Germany's Type 209 diesel boat as an example of modern technology, this very quiet submarine still requires six hours of snorkel time to charge its batteries, is limited to about 100 meters of depth and must patrol at one to two knots to retain its stealth advantage. The Russian Kilo design, on the other hand, is capable of going without snorkeling for as many as two to three days at a two or three knot patrol speed. As such, it is a much more capable adversary.

Despite the ability of the diesel boat to be a devastating threat, U.S. analysts discount their effectiveness in the hands of third world crews due to a lack of training. Whether these assumptions would prove true in the real world or not remains to be seen, but the *Harpoon 3™* commander can learn from the reasoning behind this assumption and employ the antithesis to make his diesel forces stronger.

The presumption is that these crews will expose their masts much more than necessary, because they do not know how to conduct a passive plot correctly. Further, there is a great deal of skepticism that they are capable of making a deep submerged approach on batteries, the most advantageous tactic, because of a constant need to refine their position estimates in relation to the target. It is also assumed that diesels resting on the bottom would snorkel at least once a day to preserve the amount of battery power they would need to escape after an attack. This line of reasoning reflects a dangerous tactical arrogance. Whether or not these potential adversaries are currently capable or not, they could become so in short order under the right circumstances. The prudent commander can never discount this threat on the presumption that it will be improperly employed.

17.1.4 Summary

If used properly, with forethought and patience, the commander of submarine units possesses a powerful force multiplier. Further, in the correct tactical placement, submarines can contribute to all of the warfare mission areas, including Strike, AAW, and EW, not just ASW and ASuW as in the past.

18.0 Anti-Submarine Warfare (ASW)

Soviet ASW forces have long emphasized active acoustic detection. This is effective against submarines regardless of how quiet they might be…
-The Naval Institute Guide To The Soviet Navy (1990)

Because of their inherent capability for stealth and surprise, submarines are the most deadly adversary faced by modern naval commanders. Until recently, the bulk of U.S. ASW doctrine focused on countering a Soviet submarine threat out of the Norwegian Sea and the Greenland-Iceland-United Kingdom (G.I.U.K.) Gap, intended to interdict the sea lines of communication (SLOC) in support of a ground war in Europe. With the dissolution of the Soviet Union, this possibility has virtually evaporated. In its place, however, looms a broader, potentially more devastating threat.

With the loss of an obvious challenger for open ocean supremacy, and a political climate emphasizing budget reduction, the U.S. maritime structure is being incessantly whittled away. Further, the naval hierarchy is shifting mission emphasis away from strategic control of the oceans to support of joint operations in coastal conflicts. In this capacity, the blue-water turned brown-water navy is viewed as a method of quick power projection ashore, via air and missile strikes as well as amphibious ground forces. Astute naval commanders are aware that, in order for power projection operations to be undertaken with an acceptable degree of risk, sea control of the objective area must first be obtained. Therein lurks the new danger.

The former Soviet Union (Commonwealth of Independent States, or CIS) is strapped for cash and its most readily available export commodity is hardware from its once-mighty military machine. Although their arms sales efforts have already extended to all platform types short of nuclear weapons, we will focus exclusively on their support of submarine proliferation. Most notable amongst current negotiations are the purchase of several Kilo-class submarines by Iran. These boats represent some of the most advanced diesel electric technology in the world, which gives them a very quiet acoustic signature. One need not be a military analyst to appreciate how the presence of such platforms would complicate naval operations in any future Gulf conflict. Additionally, Libya, Syria, and Algeria, all of whom already operate Soviet submarine designs, may obtain additional modern boats.

When you add these developments to the fact that shallow-water ASW is the most difficult type of ASW to conduct, one develops an appreciation for how any new maritime strategy must place additional emphasis on this warfare area. In the remainder of this section, you will find detailed briefings on the impact of oceanographic conditions on tactics, area vs. local ASW, how to assess your own force's capabilities, and other topics of vital importance to battlefield survival.

18.1 The Environment

Sound propagation in the ocean is affected by temperature, pressure, and salinity. Of these, temperature is the dominant characteristic. The ocean temperature varies greatly with depth, but somewhere between 100 and 300 feet there is usually an abrupt change between the relatively warm surface waters and the cold, still depths beneath. This rapid change in temperature is known as the thermocline, or sometimes 'the layer'. Beneath the layer the water temperature tends to be isothermic, or relatively constant. The layer is tactically significant for several reasons. First and foremost, sound emanating from a source on one side of the layer (either above or below) tends to remain trapped on that side of the layer. Simply put, the sudden change in water temperature causes sound waves to bounce back from the layer. It is not an impenetrable barrier; there is some leakage, particularly with very high frequency noises like cavitation (the effect where bubbles produced around propellers collapse noisily in the wake) and active sonar transmissions. A general rule of thumb, however, is that most noises will be greatly attenuated (reduced) if they must pass through the layer. You will therefore hear noises made on your side of the layer much easier than those emanating through it.

In reality, layer depth varies from location to location and submarines try and stay comfortably beneath it to help hide from surface ships. In *Harpoon 3™*, the thermocline always defines the boundary between the Shallow and Intermediate depth bands.

18.2 Active vs. Passive

Commanders must constantly assess whether their sonar emissions policy should be active or passive, based on the tactical situation. To understand the basics, it is important to first illustrate the influence of the layer in a generic encounter between a surface ship (Blue) and a submarine (Orange). In the first case, (Figure 6) Blue is operating at 5 knots towing a passive sonar array above the layer. Orange is also operating at 5 knots below the layer. Note that the sound waves emitted from both platforms are minimal, so only those crossing the layer at an acute angle (e.g.. straight down or up) will penetrate, while the bulk of the sounds will be reflected or refracted. Those sound waves that do penetrate directly through the layer form a narrow cone of sound. In this case for either Blue or Orange to detect the other, they must physically pass through the direct path cone, which means they would virtually be on top of one another, and detection would be almost simultaneous.

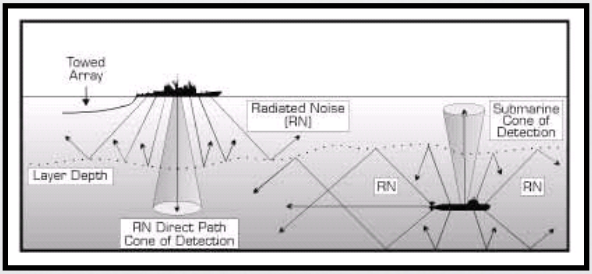


Figure 6: The effect of the layer on sonar detection.

In our second example, (Figure 7) Blue is towing his passive sonar array below the layer. All other conditions remain the same. Blue is now be able to directly receive any sound waves emitted by Orange, which means that he would detect Orange at a considerably farther range, while remaining undetected himself. The actual detection ranges will vary with the amount of noise emitted by Orange, as well as the sensitivity of Blue sonar suite. Base noise levels will also differ from platform to platform (some subs are quieter than others) and will be increased by noisy activities such as moving quickly or firing weapons.

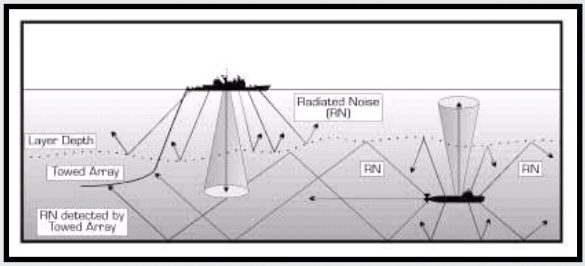


Figure 7: The effect of a towed array below the layer.

In our third example we'll look at how Convergence Zones (CZ) work. As you go down into the ocean depths, the pressure steadily increases. This change in pressure also equates to a change in the speed of sound, which rises as the water becomes denser. Different depths end up having a different speed of sound. Sound waves which travel down into these depths are bent by this effect and slowly refracted back towards the surface in a long sweeping curve, surfacing many miles away. If conditions are right, these sounds will bounce off the surface and start back down into the deeps again on another long curve. The locations where these sounds reappear near the surface is called the convergence zone. CZs occur about every 66,000 yards (33nm), centered on the location where the sounds originated. They form an annular pattern of concentric circles around a noise source. Sounds traveling on a direct path from A to B might fade out relatively quickly (after a few miles perhaps), but sounds caught in a convergence zone might propagate for over a hundred miles with much less attenuation. Sensitive sonars capable of recognizing CZ signals are very important sources of tactical information.

The picture in figure 8 shows a Blue surface ship using its active sonar. Modern active sonar transmissions are extremely powerful (about 250 dB) and are capable of literally boiling the seawater surrounding the transducer. Power outputs any higher than this are useless because boiling seawater makes for a lousy conductor of sound. Generating this much noise in the water makes this ship counter-detectable at ten times its own range. As such, Blue is considered to have surrendered the initiative to any subsurface threat within 100nm, as his transmissions act like a giant homing beacon.

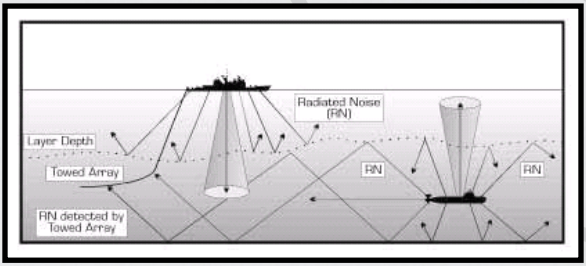


Figure 8: The effect of a hull mounted active sonar.

Blue will get reflections (detections) from his active sonar out to about twenty miles. The submarine in this figure is hiding beneath the layer however, and is still relatively safe from the bulk of Blue's active sonar signal (which is bouncing harmlessly off the layer). Some of Blue's sound energy will penetrate through layer and travel down into the deep sound channel. There it curves back towards the surface and reflected down once again. Eventually, some of the noise that Blue is making finds its way to the surface ship in the second CZ. While Blue is deaf to anything but the short range echoes of his active sonar, the possibility exists that this other surface ship will hear him from many miles away.

Note that some of Blue's sonar energy does penetrate the layer at an angle which might allow for a direct path detection, were the submarine close enough. In this case however, the angle of incidence is not enough, and the submarine will escape detection, so long as he stays away. Active sonar is good for immediately localizing a near target, especially one on the same side of the layer with you. For more information on how *Harpoon 3™* models sonar and convergence zones, see the technical notes at the end of your manual.

Let us consider now another case, where Blue possesses a variable depth sonar (VDS) in conjunction with his towed array. By putting the combination of active and passive capability on the same side of the layer as Orange, Blue can listen for Orange as before, but as soon as he feels Orange is within striking distance, he may selectively go active for one or two transmissions from the VDS and obtain an immediate targeting solution on Orange. The range at which a return echo is strong enough to provide this solution is again variable, depending on the type of sonar, the aspect of the target, the presence or absence of anechoic coatings, and numerous other factors. While listening below the layer as noted above, the hull mounted sonar is still capable of passive or active operations above the layer. This configuration is optimum for the conduct of blue-water ASW.

18.3 Shallow-Water Operations

Earlier, it was indicated that shallow water operations are the most difficult to conduct; it is now important to explain why. In the examples just presented, you may have noted that as a rule, passive

detection ranges far exceed active ranges. When an active contact is held, both parties are usually within striking distance of one another. Naturally, the commander would prefer to expand his battle space and engage the enemy before he gets within striking distance. As such, passive operations are the norm in most cases. Shallow water operations are an exception to this rule.

Although biological noise sources are present throughout the ocean, and are frequent sources of false contacts (i.e.: whale blowing sounds like ballast tanks being blown), the highest concentration of biological activity is in shallow water. Further, wave and tidal action, the influx of rivers and estuaries, and other natural phenomena combine to make passive ASW virtually impossible for either side, although submarine sonar operators are a little more adept at sorting out background noises than their surface counterparts.

The second factor to consider is that shallow waters have a minimal thermal gradient and none of the aforementioned layer of CZ effects. As such, both surface and subsurface units are always on the same side of the layer. Although no sub commander would ever surrender his only advantage (stealth) by using active transmissions to search for contacts, surface forces are virtually required to use active sonar whenever a shallow water submarine threat exists. Again, while this must be done with counter-detection ranges in mind, the task force commander obviously must have some other reason to sacrifice strategic mobility and operate close ashore. Therefore he must assume he is already detected, if not targeted. Given that, the logical choice is to adopt the best defensive posture for the force and hope his surface search radars pick up any periscopes from lurkers setting up a shot. What we have not explored up to this point, however, are the measures he may have taken to minimize that threat during his transit to the area of operations.

18.4 Joint ASW

For a theater level ASW campaign to be successful, the commander must correctly employ all available ASW assets: surface, air, and subsurface. Each component of the ASW triad has strengths and weaknesses that must be clearly understood for proper tactical use. Of the three, submarines are the most effective at finding and killing other submarines. The root of their strength lies in stealth as well. A low self noise means they can hear sound just as well as their prey. Because submarines can best accomplish this mission area as solo players, the use of SSNs as Hunter-Killers will be discussed separately, in the section below entitled "Commanding a Submarine". Here we will focus on the interplay of surface and air assets attempting to detect, localize, and target submarines in a layered defense. These phases of an engagement are analogous to the aforementioned qualities of passive cross fixes, and understanding their meaning is critical to subsequent discussion.

ASW Phases of Engagement:

- **Detected** – Regardless of the source of data, active or passive, the commander has reason to believe that the presence of a submarine is possible (PossSub) or probable (ProbSub).
- **Localized** – The submarine contact has been localized to a small enough area of probability to allow attack with a reduced chance of success.
- **Targeted** – The range and bearing to the target as well as the target's aspect, course and speed are known with sufficient certainty to attack with a high expectation of success.

18.5 Area ASW

Area ASW has several applications, but the specific platforms and tactics used to conduct it remain constant throughout the range of applications. The platforms of choice are maritime patrol aircraft (MPA), like the P-3 Orion, and towed array equipped surface ships, because each possesses endurance and potency, in terms of weapons load. SSNs also conduct area ASW, but, again, their use will be explored later. Of the two, towed array assets cover a greater area, but require more time to do so, while MPA assets cover more area per unit of time, providing a quicker search of a smaller area. An alternative choice for area ASW involves carrier-based aircraft. Although they have a shorter endurance and lighter weapons and sonobuoy loads, they make up for it by being close to the action and having shorter transit times.

Area ASW is the coordination of search efforts ahead of the main force on specific areas of ocean holding tactical significance. The objective of Area ASW is to detect and localize any submarines within the area as a minimum, and to destroy them should the tactical situation and rules of engagement allow. Within the concept of layered defense, area ASW provides the first opportunity for a commander to attrit enemy submarines.

Examples of area ASW would be the sanitization of chokepoints, such as straits and narrows, by a ship equipped with a towed array operating 30-50nm ahead of a task force along the PIM. Also, a task force required to transit at high speed is less vulnerable to subs closing in from behind the force, but much more vulnerable to subs laying ahead and to the sides of the PIM. These task forces may use patrols of MPA assets 150nm in advance of the force and on either side for the duration of the transit.

In the conduct of area ASW in *Harpoon 3™*, the commander may specify the area of interest for the MPA asset to prosecute by laying out a patrol area bounded by reference points.

18.6 Local ASW

Once submarines have penetrated past the units conducting area ASW, their next obstacle to overcome would be the outer screen. As was discussed briefly in the section on unit positioning, outer screen assets should consist of ASW and AAW platforms, to allow for mutual defense in conjunction with their picket duties. Assets of the outer screen should be passive and conducting search operations above and below the layer.

Because of their separation from the main force (12-24nm with a preference for even more distance), any contacts generated by units of the outer screen will generally pose an immediate threat only to those units and not to the main body. Cruise-missile-equipped submarines may be an exception to this rule; though if the main body stays in strict EMCON Alpha (no betraying emissions), it is likely the submarine does not have enough information to fire on them. Still, prudent commanders will turn the main body away from the contact while the screening units attempt to prosecute it.

Screening units should jump all over the submarine contact with helicopters. With at least two ships and a helicopter holding passive contact, the targeting solution should come rapidly enough to conduct a torpedo attack with aerial delivered weapons. A stand-off weapon, such as an ASROC, may be used if the submarine is in too close. Alternately, if the passive contact is of sufficient strength that the on scene commander believes the submarine is within his active envelope, then he may elect to go active with the sonar and conduct an immediate over-the-side shot. Whether this attack is effective or not (and it generally is one of the least effective methods), it does succeed in putting the submarine on the defensive, buying the commander time for a more thorough follow-up attack.

The tactic just discussed is also the tactic of choice should a submarine be fortunate enough to penetrate to the inner screen. Because it has already achieved firing position on the HVU of the force, any and all efforts must be made to distract that submarine from attacking. Time is of the essence in getting weapons in the water, even if they are not accurately targeted. Concurrent with these attacks, the commander must execute all appropriate torpedo evasion maneuvers based upon his knowledge of the loadout carried by the class of submarine contacted.

18.7 Task Force Defensive Tactics

The scenario of a prowling submarine inside the boundaries of a formation is the nightmare of every task force commander. As such, there has evolved a body of doctrine that may be selectively employed by the *Harpoon 3™* commander to complicate enemy efforts to achieve this position. Obviously, all of the considerations relative to EMCON posture and counter-targeting still apply, but the commander may also decide to invoke a zigzag plan. A submarine commander may not wish to risk sticking a periscope out of the water or using active sonar, so he must perform a passive Target Motion Analysis (TMA). Simply put, a submarine commander will determine the course and speed of his targets by observing them passively and calculating relative motions from the bearing changes he sees. Since passive sonar consistently gives a direction to a target, but no other information, the submarine must perform this TMA on targets for several minutes before they are certain of their information. If the target suddenly decides to zigzag, all this careful work goes right out the window and the submarine must start all over again. Once the submarine commander has a working solution on his targets however, he may fire modern homing torpedoes or missiles. This targeting solution is what the task force commander is trying to deny the submarine commander.

Harpoon 3™ does not include any preset zigzag plans, but the user can easily create them via the navigational plotter. Occasionally introducing a zigzag in your group's course will further complicate any submarines attack against you.

18.8 Summary

Submarines pose the greatest sustained threat in the multi-threat environment. Commanders must consider their ASW posture as an integral part of all mission planning. To successfully prosecute submarines, one must have an understanding of the tactical elements of the environment they operate in, and use every ASW asset at hand to counter their inherent advantages of stealth and surprise.

19.0 Air-to-Air Warfare

Fight on and fly on to the last drop of blood and the last drop of fuel, to the last beat of the heart.
-Baron Manfred von Richthofen

In *Harpoon 3™*, air to air combat is covered generally, a direct result of the tactical level of the simulation involved. The game will calculate combat results based on the Air-to-Air loadout (ATA) of the various parties involved. Combat involves a comparison of the ATA between the incoming weapon and the target; a difference is obtained between the two ATAs and this difference is added to the base percentage to hit (PK) to obtain a final PK value. A random number generator then generates a value; if this is at or below the PK number the weapon is considered to have hit.

Damage sustained during air to air combat is not modeled. The plane is considered removed from play should it sustain a hit.

AIR COMBAT MANEUVERING 9DOGFIGHTINGO IS NOT MODELED IN HARPOON 3 AS THERE IS NO REQUIREMENT TO MODEL AIR COMBAT TO THAT EXTENTM GUNS OPERB ATE THE SAME WAY AS OTHER WEAPONS DO WHEN IT COMES TO COMBATM

20.0 Strike Warfare

My fellow Americans, I am pleased to tell you I just signed legislation which outlaws Russia forever. The bombing begins in five minutes.
-President Ronald Reagan

Strike Warfare is the heart of power projection. The commander ensures that sufficient force exists to accomplish the mission while husbanding limited resources. Understanding the strengths and limitations of the enemy IADS, as well as the strategic placement of those forces, is essential to strike planning. There may be some application of force prior to the main strike, but the prudent commander will always plan the main effort to arrive simultaneously (Simultaneous Time On toP (STOP)).

Careful **Strike planning** is essential to ensure the success of **Strike Warfare**. It is usually composed of several steps. The commander must progress through each of these in the formulation of a viable plan. In order of execution, the elements requiring consideration are as follows:

- **Target Value**: The target value is a measure of the targets strategic importance.
- **Target Composition**: A target (an airbase for example) may consist of many different parts (SAM and AAA sites, weapons storage bunkers, fuel and oil storage facilities, hangers, runways, etc.) The Target Composition needs to be considered carefully when planning a Strike mission.
- **Strike Composition**: After considering **Target Value** and **Target Composition** the Commander needs to decide which of his assets he should commit to the planned strike.
- **Ingress and Egress**: Plotting ingress and egress routes to ensure survivability of retrievable assets is a critical part of strike planning. One of the simplest methods of doing so is to plot ingress and egress routes for the strikes to avoid ancillary defenses, remain undetected for as long as possible, and minimize the time spent within the enemy zone of engagement.
- **Strike Timing**: Strike timing is a necessity in larger strike packages, dividing forces into distinct groups and elements, and assigning each a mission that supports the concerted effort. The objective of Strike timing is to achieve a condition known as Simultaneous Time On toP (STOP).
- **Battle Damage Assessment (BDA)**: Battle damage assessment (BDA) is the name given to reconnaissance performed to assess the effectiveness of an attack and determine the need for any follow-up attacks on the same target.

Remember that although each topic is different, none of them operates exclusively of the others. In the formulation of a plan, if you are unsatisfied with your assessment of any of the planning steps, then it is generally wisest to scrap the plan until the limiting factor that gave you pause has been eliminated.

20.1 Target Value

The Target Value is a measure of the targets strategic importance. Estimating the target value is the first step of strike planning. For the commander to be willing to commit portions of his force to the destruction or reduction of a target, the target must have some significance to the achievement of mission objectives. While this may seem a moot point, in reality neglecting the mission objective in Strike Planning is a common mistake.

The conduct of war is never static; while one is attacking, one must also guard. With this axiom in mind, consider astute opponent Blue, who offers a sacrificial lamb to the strike planner, Orange, who is closing Blue's coast to attack a port or airfield. This offering might take many forms, but we will consider it to be an attractive surface action group that is out of position to contribute to the immediate tactical situation. As Orange nears his primary objective, Blue directs the surface action group to radiate and make its presence known. Blue hopes that the SAG, though not an immediate threat to Orange, will prove so tempting a target that it cannot be passed up. If Orange complies with Blue's deception and commits a significant portion of his strike package to the target of opportunity, he has unwittingly shifted the tactical advantage of initiative to Blue.

As a minimum, Blue will delay the attack on the prime objective and attrit portions of Orange's strike package directed at the SAG. This reduces the number of missiles and aircraft available for Orange's subsequent efforts against the primary target, which increases Blue's chance of survival. In the optimum case of this deceptive effort, however, Blue is now in position to strike Orange's main force first, while his attention and the bulk of his forces are directed elsewhere. Blue could be decisive in this action or, even if marginally successful, his efforts could reduce the Orange force to the point that its commander deems it unwise to continue operations against the Blue base. While this case illustrates a potential use of strategic deception, the required lesson for the strike commander in *Harpoon 3™* is to ensure that the target of your efforts support the mission objective; don't attack something just because it seems to be an easy target.

20.2 Target Composition

In *Harpoon 3™*, bases possess discrete targetable components. There are individual SAM and AAA sites, ground radar installations, command and control bunkers, weapons storage bunkers, fuel and oil storage facilities, hangers, runways, and other support facilities. The destruction of any of these targets will impede the enemy commander in performing the relevant functions until repairs are affected.

Strike planning requires the commander to divide components of the striking force to deal with each of these elements in turn. Although it may seem that this complicates the strike planning process (and it does to some degree), it also provides greater realism and flexibility in terms of tailoring strikes to support specific needs. For example, if one is attempting to preclude a secondary base from supporting the object of a main attack, it isn't necessary to strike that base's runways to keep aircraft on the ground. The naval commander will seldom have enough aircraft and missile resources on hand to conduct a simultaneous attack on two or more land facilities. The strike package aimed at the secondary base may consist exclusively of jamming and fighter aircraft. The jammers can confuse the command & control of the base's radar picture, engage active radars with home-on-radiation missiles (HARM) and distract airborne interceptors away from the main group. The fighters can conduct an offensive sweep of the interceptors, again to preclude their efforts to support the base which is the object of the primary attack.

Another example of this approach would be a strike targeted specifically at the weapons bunkers of an installation. If destroyed, the enemy would have only those assets at the SAM sites or already on the hardpoints of aircraft to conduct further offensive or defensive operations. Plus, there is always the chance of some beneficial secondary explosions.

A subject which comes part and parcel with composition is location. Although strike planning against fixed targets like port facilities and airbases is simplified due to their lack of mobility, location and composition still require analysis. The location of a target is important because it determines both the line of demarcation of the striking force and the envelopes of engagement of supporting forces. The line of demarcation is the maximum range at which a strike commander can begin to employ force on the intended target. Because this line reflects the extended ranges of attack aircraft at reduced weapons loads, it is most often not the effective strike range. To obtain the maximum effective strike range, the commander must consider the feasibility of in-flight refueling for all of the fully loaded strike elements he has determined necessary to conduct the strike. The inverse of the line of demarcation is the maximum engagement envelope of enemy long range air assets and land based surface-to-surface missile systems. Within this context, it should be apparent that the strike commander must not only be concerned with the capabilities of the targeted base, but must also consider the proximity of other bases to the target which could multiply enemy defenses.

As you can see, the possibilities are endless. As a strike commander in *Harpoon 3™*, the important thing to remember for this phase is to match the specific target types to the mission requirements and to always remain aware of both the line of demarcation and the enemy's zones of engagement.

20.3 Strike Composition

With a firm grasp of the first two factors in Strike Planning, the commander may now analyze what elements of the force are best suited to conduct the mission and what weaponry they will carry to do so. In discussing these dispositions, one will hear references to the strike force, the strike group, and the strike element. Understanding their relationship is important. A strike element is a single sortie group of one to six aircraft of the same type. Strike elements may be larger, but it is generally not advisable, as this simplifies enemy intercept and counter-targeting efforts. Strike groups are composed of all strike elements, regardless of type, originating from the same unit. A strike force is all of the assembled strike groups that will attack the same target, regardless of their point of origin.

Some targets may be prosecuted by a single strike element, such as a pair of Harpoon-equipped A-6 Intruders engaging a group of missile patrol boats operating outside the enemy air defense envelope. In this scenario, since the weapons of the strike aircraft outdistance the range of the enemy's best AAW weapon, and the strike planner need not be concerned with enemy air intercept, a small aircraft group is sufficient to deliver decisive force. Other targets may require the coordination of all aircraft and Tomahawk Land Attack Missiles (TLAM) within one or more CVBG's to penetrate and saturate enemy defenses. The more sophisticated the IADS, the more diverse your approach must become.

Consider the approach adopted by the Coalition Command at the outset of the air war against Iraq. Iraq's IADS at the commencement of hostilities was estimated by Intelligence to be seven times more lethal than the one deployed around Hanoi at the height of the Vietnam War. Hanoi's concentration of SAM sites virtually precluded low-level precise delivery of munitions throughout the war due to unacceptable loss estimates, yet Iraq's system exacted 1/3 the casualty rate per 1,000 sorties during Operation Desert Shield/Desert Storm. The reason behind this seeming inconsistency between expectations and results lies in the systematic reduction of Iraq's IADS through proper strike planning.

Major General John Corder, U.S. Air Force, Director of Central Command Air Operations, employed a comprehensive, yet easy-to-understand, approach. *Harpoon 3™* commanders should use it as a guideline in their planning of major coordinated strikes by diverse elements. The precursor of the attack was a massive barrage of communications and radar jamming by coalition aircraft. The jammers remained in position to engage and destroy enemy radar sites with HARM, ALARM and other anti-radiation homers as they went active. From behind the wall of electronic noise emerged 100 TLAM's directed at fixed radar sites and command & control facilities. F-117's supplemented the TLAM's against the most hardened facilities and succeeded in severing the head from the IADS structure. Lacking central coordination and targeting information, the remaining pieces of the IADS were left to operate independently against the successive waves of strike aircraft operating with supporting fighter escort. With their eyes and ears destroyed, however, all shots fired at aircraft by these facilities were unguided and, therefore, inaccurate. The results of successful planning, timing, and coordination are telling: one F/A 18 lost on the night of the strike for virtual destruction of an entire nation's air defense system.

20.4 Ingress and Egress

Plotting ingress (insertion/entry) and egress (exiting) routes to ensure survivability of retrievable assets is a critical part of strike planning. One of the simplest methods of doing so is to plot ingress and egress routes for the strikes to avoid ancillary defenses, remain undetected for as long as possible, and minimize the time spent within the enemy zone of engagement.

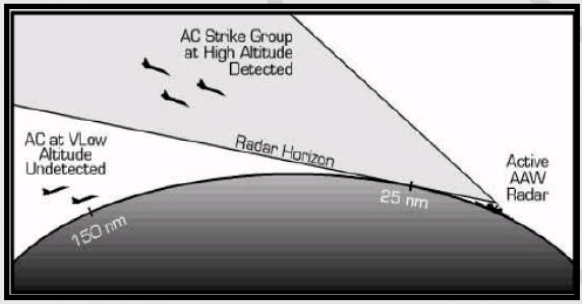
Although it is not always possible, due to the overlapping nature of defensive air networks, the strike planner should strive to avoid entering the weapons envelopes of units other than the primary target, and avoid theirs as well if sufficient stand off weapons exist. To do so, refer frequently to the tactical overlays provided for the *Harpoon 3™* map.

Plot air group movement to avoid overlapping circles of enemy air coverage. Further, if you must pass through these circles, do so as close to tangentially as possible. This approach presents the enemy with a long range crossing shot, the least effective possible engagement posture.

Also, one may note that many coastal facilities now have ecliptic cones of radar coverage versus circles to more closely reflect their real world counterparts. For an equivalent signal strength, a directional radar has much greater range than an omni-directional radar. Since a threat is perceived to be coming from outside the country's borders, as opposed to within, the focal point of these radars will be directed off shore and the portion of the ellipse behind the installation may be tens of miles deep rather than hundreds. When this occurs, if the strike planner has the opportunity to cross the enemy coast elsewhere and strike these targets from behind, it is always a sound tactical move to do so with at least one strike element, if not more.

When the transit phase is complete and forces are in position to conduct the attack, then the planner should allow for a direct path from the edge of the enemy weapons envelope to the launch range and back again. This approach minimizes the time during which strike elements may be counter-attacked. Further, by adopting a multiple-axis attack (some of which can be deceptive groups), the strike planner spreads the enemy defenses among the strike elements, which again increases the chance of success.
Remember also that, to be targeted, one must be detected. The longer the strike planner can delay that detection, the more survivable the strike elements become and the greater chance of success for the strike force as a whole. The primary methods of influencing these variables in the *Harpoon 3™* model are via altitude assignment and EMCON posture.

Radars are essentially horizon dependent when it comes to maximum range. This fact explains why a surface search radar has very limited maximum range in comparison to an air search radar, some of which are capable of detecting inbound aircraft at hundreds of miles, provided the aircraft are above the radar horizon. To understand the importance of the radar horizon, consider the following example:



Both elements are from the same strike group and are 150nm from their intended target, represented by the generic surface ship. Note that the higher aircraft are already detected by the air search radar of the target, because, by being at high altitude, they are above the radar horizon. The other aircraft, however, are operating at very low altitude. As a result, they will not cross the radar horizon until about 25nm from the target, minimizing enemy reaction time and allowing for a more effective attack. If the lower aircraft were cruise missiles instead of aircraft, this range could be even shorter, on the order of 15nm, because of the extremely small radar profile and sea skimming altitude of the missile.

Note that the radar horizon generally extends beyond the visual in the lower atmosphere, particularly at sea level. This phenomena would be insignificant if it did not have tactical implications. Remembering that radar requires the reflection and return of the transmitted signal to the antenna, the strongest returns are generated in the center of the transmitted waves. Argentine A-4 pilots utilized this knowledge to perfect low level approach patterns during the Falklands War. In essence, what they did was adopt a very low profile similar to the lower aircraft in the preceding example. As soon as the ESM threat warning gear lit up, however, to indicate their crossing of the radar horizon, they would drop in altitude. The momentary exposure was insufficient for British radar operators to discern the contact and skilled Argentinean pilots were able to conduct this maneuver up to three times on a standard approach at progressively closer ranges. The technique came to be known as “pecking the lobe”, and it was employed with great success to compress the battle space and reaction time afforded the British commander. Were it not for fusing delays associated with the Iron Bombs carried by the A-4s, it is very likely that many more hulks of British warships would litter the ocean bottom around the Falklands.

20.5 Strike Timing

Strike Timing is a necessity in larger strike packages, dividing forces into distinct groups and elements, and assigning each a mission that supports the concerted effort. This practice increases the survivability of individual elements, as the enemy’s counter-targeting is complicated and decreases the amount of ordnance lost due to jettisoning when the enemy does intercept, but it also complicates the coordination effort of the strike planner. As noted in the beginning of this section, the strike planner is analogous to an orchestra conductor. In that role, if even one element of the whole fails to show up on time, or plays out of concert with the others, the entire movement is jeopardized.

The easiest method of establishing the timeline for the strike is to work it backwards, from the moment the last weapon would be delivered to the launch times for the various elements. The planner can discount flight deck limitations to a degree in the *Harpoon 3™* model, as the staff assistant allows for the assembly of each strike element in loiter before proceeding to target. The critical considerations will be missile time of flight (if one is using these assets as a part of the strike package), aircraft time of flight (which can vary between strike elements if the planner has implemented circuitous maneuver or a multiple axis attack), and weapons time of flight for the aircraft armament packages selected. Naturally, if one is using point weapons like free fall bombs and munitions canisters, this latter consideration can be discounted. Otherwise, with guided or precision munitions, their time of flight must be considered.

By starting with a time of impact and considering weapons' flight time, including TLAMs, from the selected launch points, the commander knows what time the launch platforms must arrive at those points. When this is known, the commander can again work backward along the plotted movement leg for each aircraft element and determine when they must clear the deck to commence the mission. The objective of all this number crunching is to achieve a condition known as Simultaneous Time On toP (STOP), the equivalent of strike planner's nirvana. When STOP occurs, it means that all of a strike's ordnance arrives at the same instant, which is guaranteed to saturate the most cohesive enemy defenses.

20.6 Battle Damage Assessment (BDA)

BDA is the name given to reconnaissance performed to assess the effectiveness of an attack and determine the need for any follow-up attacks on the same target.

If manned aircraft were part of the initial strike package, then an initial assessment of the damage inflicted will be provided. This assessment may be inaccurate, and the commander can refine its authenticity (in the case of ASuW attacks) by including a reconnaissance aircraft as one of the last elements to enter the target area. In strikes against land based targets, the commander may obtain accurate satellite data on the effectiveness of his strikes after a period of a few hours.

20.7 Anti-Surface Warfare (ASuW)

ASuW is slightly more difficult than AAW, because one must invest more time establishing hostile intent and refining the over-the-horizon targeting solution. Several factors must be considered when one is contemplating an ASuW strike, including target composition, delivery platforms, which ordnance package(s) will best accomplish the job, and timing. Because surface units begin with a limited number of ASuW weapons, it is generally advisable to husband these resources if air groups are available to prosecute the attack.

Not just any air group constitutes an appropriate strike, however. Proper strike planning requires the player to consider the enemy's defenses and the amount of ordnance that must be delivered to achieve the objective of the strike. Weapon types must be matched to target types, but, more importantly, the strike aircraft must be given a reasonable chance of reaching their launch points.

In the previous section, the player viewed an ASuW strike from the receiving end, with the goal of destroying that strike before it could prove decisive. In this section, we will reverse roles and capitalize

upon this new found AAW expertise to exploit it for our own purposes. The *Harpoon 3™* commander must learn how to evaluate enemy defenses and develop a plan to overwhelm them in support of the ASuW mission area, first through air assets and then with surface ships.

20.7.1 Over-The-Horizon Targeting

Since enemy surface task forces are mobile, the first step to prosecuting them is to find them. Some guidance has already been provided on passive cross-fixing, which is a form of Over-The-Horizon (OTH) targeting, in the section on electronic warfare. As such, this section is designed to supplement that information by discussing the role of ship based helicopters in OTH targeting.

As a stand-alone search platform without any initial locating information on the enemy force, the helicopter has limited effectiveness. Armed with even a single ESM detection of a sensor on a platform of interest, however, the helicopter can begin a line of bearing search to attempt to acquire that target. If the helicopter flies out the line of bearing to its maximum radius and doesn't discover anything, it was not a wasted journey. At least the tactical commander has good reason to assume that the enemy platform is beyond that maximum range.

Helicopters are best employed, however, when a rough area of probability has been obtained on the enemy force, such as when they are radiating intermittently. In this instance, the helicopter approaches the area of probability from off axis, so as not to provide the enemy a line of bearing to its launch platform should it be discovered. Once the pilot estimates that he could be above the radar horizon (see the strike warfare section for a full explanation of this concept) of the enemy group should they radiate, he must slow down and reduce elevation.

For the duration of the approach, the helicopter should fly slowly and under 50 feet to make detection difficult, using their small radar and visual cross section to remain undetected, even when within sight of the formation being targeted, and while maintaining a directional data link back to the parent platform. If these same helicopters are also ASuW missile capable, such as the British Lynx, then the commander may use them to conduct the first pulse of his strike package from their undetected position at short range. Indeed, such tactics proved devastating to the Iraqi Navy during Operation Desert Storm, which has prompted considerable open debate by policy makers in other purely coastal navies.

Alternately, the helicopter may conduct a search tactic known as jumping jacks. From the standard search profile of 150 feet at cruising speed, the helicopter pops up to between 500 and 1000 feet, does a visual scan and a couple of quick radar sweeps; if nothing is spotted, then it dives down to the deck again. The process is repeated about every 7-9nm during the search at the pilot's discretion. This tactic puts the helicopter at greater risk but increases the scouted area.

20.7.2 Evaluating Enemy Defenses

Commensurate with the effort to refine the targeting solution for the conduct of an ASuW strike, the commander must also classify the composition of the enemy force to the best of his ability. The more accurate this assessment, which is based on the correlation of sensor and bearing information (as explained in the Electronic Warfare section), the more correctly the commander may determine the defensive power of the formation to be targeted.

When several asset types are possible, the prudent commander always assumes the worst case scenario. Applying this logic to all of the discrete platforms that have been detected, the commander comes up with a composite picture of the enemy force. Using the *Harpoon 3™* database and the formula presented to calculate a ship's AAW capability, the commander can reliably estimate the

required saturation level for the intelligence composite he has developed. Armed with this knowledge, the commander may begin strike planning in earnest. One note of caution must be mentioned, however: The saturation estimates are only as accurate as the classifications of the target types. It is possible to either overestimate, wasting precious weapons, or underestimate, endangering the strike elements themselves.

20.7.3 The ASuW Strike Group

Once the target has been classified and targeted, the commander must have a strike package ready to assign to the threat. We have already noted that it is best to conduct ASuW strikes with air assets, whenever possible. Bearing that advice in mind, let us consider a strike against an enemy CVBG, to illustrate one possible composition and approach. First, you should launch 4-8 fighters in two groups on patrol missions in the area you expect to encounter enemy CAP. You cannot launch them on strike missions because their ordnance does not match the target type. Immediately following this, the commander should launch all ARM or HARM capable aircraft to engage any air search radars that go active in the target group. If these units succeed in blinding the enemy, the remainder of the air groups will have a milk run. Follow this with the main body of the strike force, employing stand-off and guided munitions. Iron bombs should be reserved strictly to mop up critically wounded ships after the main attack or, in the case of limited air resources, as weapons of last resort. Concurrent with the fighter sweep, but as a discrete group, the commander may also commit electronics support aircraft, such as the EA-6B, increasing the survivability of the strike as a whole. If several types of strike aircraft will be used, each should be launched as a separate group, to complicate the enemy's AAW effort and maximize the chances of the strike achieving its objective.

20.7.4 Ship-to-Ship ASuW

When air assets are unavailable to prosecute the target, surface forces must consider other factors to maximize their attacks. It is important to ensure that you have a refined, complete targeting solution prior to committing the limited assets in the magazine. Further, you must be certain of the composition of the target group. Do you know they are hostile? Will the number of weapons you are about to employ ensure saturation, based on the intelligence you have at that point? If the answer to either of these questions is no, then hold off on the attack. If you are certain that conditions are right to proceed, the next step is to establish both the timeline and the axis of the attack.

The timeline is easy to calculate using the method delineated in the Strike Warfare section. As noted there, when coordinating multiple firing platforms, the objective should be to obtain simultaneous time on top to saturate the enemy defenses. In considering the axis of attack, firing straight down the bearing to the target may be the fastest method of getting ordnance on the target, but it also allows the enemy to shoot a bearing only attack down the reciprocal course of the inbound missiles once he detects them. This is known as a "quick shot" and it is an exercise practiced routinely by surface ships. It is rarely a conclusive attack, but if fired down the correct bearing (i.e.: the original shooters did not fire off axis), it can force the enemy ships to bring up the AAW radars. This tactic would allow surviving members of the original target group to quickly counterattack with any remaining ASuW missiles.

20.7.5 Composition and Employment of Surface Action Groups (SAGs)

If enemy forces have equivalent launch ranges for ASuW weapons, then prudent commanders will dispatch a Surface Action Group (SAG) instead of endangering their HVU. SAGs are good for taking the battle to the enemy. As a rule, they can transit faster than the entire battlegroup and prosecute the attack more quickly. The commander must ensure, however, that SAG composition is adequate both to accomplish the mission and to defend itself against potential threats.

A strong SAG should be capable of posing a viable threat to a CVBG. To do so, it should include at least four medium range ASuW shooters, one long range AAW shooter, one medium range AAW shooter and, if an ASW threat is present, a couple of helo equipped platforms to counter the subs and provide OTH targeting services. Towed array assets are not important because SAG transit speeds render this sensor useless. This composition ideally means four ships of proper capability, not eight total, because each ship class should be multi-mission capable. Two- and three-ship SAGs may also be used against smaller groups or less capable ships with a corresponding expectation of success.

The optimum formation for a surface action group is a scouting line abreast with 10-12 nm spacing between units. This allows for maximum swept coverage of the scouted area, covert communications via flaghoist and semaphore relay, as well as optimum separation for passive crossfixing, as described in the section on Electronic Warfare. Also, when the target group has been located and classified, this formation provides an inherent multiple axis for your ensuing missile attack.

20.7.6 Summary

Effective ASuW requires passive cross-fixing and other over-the-horizon targeting techniques. Once forces have been detected, classified, and targeted, the commander must conduct a detailed estimate of the salvo size required to achieve saturation. Finally, in the prosecution of the attack, make every effort to conceal the origin of the attack to avoid counterattack.

21.0 Anti-Air Warfare (AAW)

I saw the lightnings gleaming rod.
Reach forth and write upon the sky
The awful autograph of God.
-Joaquin Miller, 'The Ship In The Desert'

AAW posture should be a constant concern of the naval commander, as a missile threat can materialize from all types of contact: surface, subsurface, or air. Further, with anti-surface missile speeds ranging from subsonic, in the case of sea skimmers like TASM, to Mach 4, like the HARM, an AAW threat may present an attack window with engagement time measured in seconds. If the commander has not invested the forethought and planning to be in position to take advantage of the period of vulnerability, the missile strikes home and further actions, even the destruction of the launch platform, are academic.

In determining the AAW force posture, the commander must remember the tactical axiom to "Shoot the Archer, not the Arrow", whenever possible. If the Rule of Engagement (ROE) and other constraints allow, it is always better to engage the firing platform before it reaches its launch point, thereby killing many missiles with a single attack, instead of attempting to deal with groups of multiple inbound missiles. Although this is the optimum case, it is not always attainable. As a result, the prudent commander balances the effort and resources committed to the outer air battle just described, with those necessary to provide cohesive mutual support in the inner air battle.

To illustrate the conduct of the inner and outer air battles, we must return to our earlier comparisons of the inferior and superior force. In the case of an inferior force, which has adopted dispersal as the best tactic, AAW defense is a single unit or small group proposition. In essence, it is every man for himself, and the best chance for survival in the face of enemy air superiority is to avoid detection in the first place. Conversely, remember that superior forces favor concentration and massing for mutual defense, which fits the more complicated model of integrated AAW at sea.

For the remainder of this section, the case of the superior force commander is assumed.

21.1 AAW Weapon Basics

Before examining the flow of events that occur in the outer and inner air battles, the commander must become fluent in the technical constraints which govern the employment of Surface-to-Air Missile systems (SAMs). The majority of the world's surface-to-air missile systems employ semi-active homing for in-flight guidance and course corrections. Semi-active homers require the firing platform to actively illuminate the target throughout the intercept with a missile fire control director. The number of directors a ship possesses governs the number of intercepts that may be simultaneously prosecuted. Thus, as a rule, director assignments are more limiting than launcher cycle rates in evaluating engagement potential. If the guiding radar shuts down for any reason, such as attempting to avoid an inbound HARM or being struck by the same, then all defensive missiles in flight self-destruct.

The exception to the aforementioned limitations is the Aegis fire control suite employed by the Ticonderoga and Arleigh Burke class ships. The SPY-1 radar system employs phased-array and timesharing technology to allow simultaneous tracking and targeting of hundreds of contacts and each of the four array faces can manage three missiles in flight. This means that the Aegis platform suffers none of the delays associated in switching between targets and can manage 12 missiles in a 360 degree area of coverage at any instant. Further, as an intercept is completed, if other targets remain, the system can automatically and instantaneously put another missile in the air from the vertical launch system to refill the engagement queue.

Also, because the SM2-MR missile possesses an inertial mode, if the guiding radar shuts down for any reason, all missiles in flight will continue on their last course until an intercept occurs or fuel is expended. Maneuvering aircraft can, as a rule, escape this "death gasp", but non-maneuvering missiles will generally still be intercepted. Given these capabilities, it is not surprising to see why Aegis is referred to as "The Guardian of the Fleet".

21.2 Airborne Early Warning (AEW)

The first consideration for proper AAW management is Airborne Early Warning (AEW). If you cannot see them coming outside their launch points, then the outer air battle is already lost, and the commander is forced to play catch up in the inner screen. The premier platform for AEW is the E-3 AWACs, but it is constrained by being a land-based asset. If they are available, use these aircraft to the maximum extent possible. If not, E-2 Hawkeyes are the weapon of choice to keep savvy CVBG Commanders apprised of the air threat. A well positioned E-2 eliminates the need for the CVBG to use active emissions altogether, thereby confounding the enemy's targeting efforts. He will know you are in the area, because E-2s don't materialize out of thin air, but he won't be able to localize your ships well enough to attack them without resorting to methods other than ESM.

To employ one of these AEW assets, station it in a race track loiter pattern covering the area of interest. In the case of a rapidly transiting CVBG, for example, this might be 100 nm ahead on the PIM. Also, since there are a limited number of these valuable aircraft, and they are very vulnerable to enemy intercept, it is always prudent to also provide one or two fighters to escort the AEW platform.

21.3 The Outer Air Battle

The primary player in the outer air battle is the fighter/interceptor aircraft on a Combat Air Patrol (CAP) mission. CAP may originate from a CVBG or a land base. Further, CAP may protect their unit of origin

or any other unit. CAP assets stationed to protect units other than their home base are known as LOng Range Combat Air Patrol (LORCAP) assets.

The proper positioning of CAP or LORCAP is to either side of the expected threat axis at 160-180nm from the units to be protected. Use the loiter command to prolong their time on station and reduce the amount of relief CAP that must be launched. From this vantage point, with AA missiles, destroying portions of strike elements and possibly causing others to jettison their ordnance to increase maneuverability and survivability. The pilot's dictum is that it is far better to flee and fight another day than press forward with a suicidal or non-decisive attack. When this latter case occurs, it equates to a "mission kill", even if the CAP does not succeed in eliminating any of the inbound aircraft.

Players must watch these engagements closely and dispatch relief CAP to the units on station as soon as they occur, so that follow up waves of attack aircraft are met with full weapons loads. Once inbound aircraft have penetrated the outer defenses, the player may have a second opportunity to engage them with CAP aircraft in ready- 5 (ready to launch quickly) status, but the bulk of them will become the responsibility of formation AAW assets.

21.4 The Inner Air Battle

In this area, the player has a little latitude tactically. Within the main body, shooters should be positioned such that they can provide a layered defense and overlapping coverage to protect the high value unit(s) (HVU), which is usually the aircraft carrier (CV), amphibious assault (LPH), command (LCC), support ships, or merchant groups. Each class of AAW ship usually has several methods of defeating inbound aircraft or missiles, including either long or medium range missile systems and point defense systems like the Phalanx. They also have electronic countermeasures, which provide a "soft kill" on missiles by luring them away from their actual targets to explode harmlessly over the ocean.

To protect the HVU, the optimum position for the firing platform is directly between the HVU and the inbound missile group. The reason for this constraint relates to the probability of kill (Pk) for the missile as a factor of the aspect of engagement. Although the ship is plotted with a circle denoting maximum effective range of the AAW weapon system, when viewed with Pk in mind, the circle becomes an ellipse. The highest percentage shot is against a directly inbound missile (Figure 10). As one nears the tangent or closest point of approach of a missile flying past the ship (known as a crossing shot), regardless of range, the Pk drops under 20%, as a rule. This reduction is because the relative motion of the intercept is at the peak speed, and most AAW missiles cannot do course trajectory changes fast enough to complete the intercept for a crossing shot as just described. As the missile continues toward other ships in the formation, the defenders may obtain an opportunity for one more attack on the missile. These tail chase engagements have a slightly higher Pk than crossing shots, but they are still below acceptable standards.

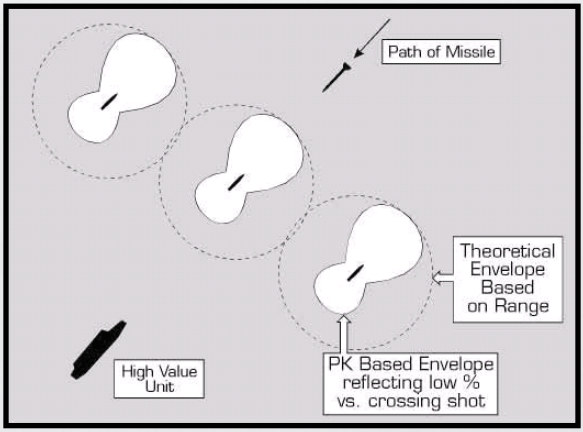


Figure 10: PK based weapons envelopes.

Given the aforementioned Pk considerations, main body positioning of AAW assets becomes even more critical. A good rule of thumb is to place Aegis-equipped ships in close proximity to the HVU, while placing lesser shooters (DDGs and FFGs) in sectors between 16-24 thousand yards from the main body on either side of the threat axis. In groups of sufficient size, where an outer screen is employed as well, AAW assets should be spaced one sector width farther away from the threat axis than inner screen units, at 18-24nm from the formation center. This allows AAW units to be interspersed with the ASW units of the outer screen and also affords a greater degree of protection from AAW attacks somewhat off the main threat axis. Naturally, the more reliably you predict the axis of attack, the more effective your units will be in the subsequent inner air battle.

21.5 Special Tactics: The Role of the AAW Picket Ship

More sophisticated tactics involve the use of AAW picket ships in either a missile trap or silent SAM configuration. When the tactical situation dictates that the main body adopts an active emission posture (i.e. their detection and localization is assured to enemy forces), positioning one or two cruisers 100-150 nm from the main body on the threat axis in total emission silence is ideal. In this configuration, the cruiser(s) can act as a missile trap, going active with their air search radars only when the incoming raid has been detected by other means and is within their engagement envelope. The hazard to this tactic is that, once these assets go active and are detected, they lack mutual defensive support and become vulnerable to individual attack.

Silent SAM is similar in terms of stationing distance, but it is a tactic that never requires the shooter to illuminate the target. Cruisers equipped with the New Threat Upgrade (NTU) SM2ER missile can receive targeting data from other sources and shoot inbound aircraft silently 75-90nm from their position, which equates to 175-240nm from formation center depending on their station. Because these

assets remain electronically silent throughout the attack, their survivability in an extended picket station is greater than the conventional cruiser employing missile trap tactics.

21.6 Calculating Defensive and Staying Power

Occasionally, it is beneficial for the force commander to calculate the defensive power of a unit against missile attack, particularly when making stationing decisions. A reasonably accurate, yet simple to obtain, method of obtaining these figures follows.

Take each ship of the force and examine its AAW weapons systems. Assign numeric values to the following attributes based upon factors listed in the *Harpoon 3™* database.

- **A** = The maximum number of intercepts per engagement cycle
- **B** = The number of engagement cycles based on maximum range
- **C** = The base Pk value of the missile system
- **D** = The effective number of engagements

Manipulation of these variables yields the equation:

A x B x C = D

Assign B a value of 1 for short range shooters (i.e.: 25nm or less), 1.5 for medium shooters (30-45nm) and 2.5 for long range shooters like the SM2 ER used in the earlier example. Continuing that example here, let's assign a value of 4 to variable A, to reflect the number of directors and a base Pk to the missile of 80%. By inputting these numbers we arrive at the following value:

4 x 2.5 x .8 = 8

Thus, we have determined that an SM2 ER unit should be capable of engaging 8 inbound targets with its missile system alone. As a rule of thumb, if the unit is the subject of the attack, one may be added to D for the presence of a point defense system, such as Phalanx, one may be added for chaff, and one may be added if the unit has defensive ECM capability such as that provided by the SLQ-32. Thus, a Leahy or Belknap class, if optimally positioned, could increase force defensive posture by 8 kills, yet has a higher saturation value of 11 in defending against an attack on itself. Beyond that, any surviving missiles will strike their target.

AAW gun systems are discounted for all classes when considering missiles, as the constraints related to proximity fusing make such employment a low Pk proposition. Their effectiveness is higher against manned aircraft, provided the latter are cooperative enough to fly within the relatively short zone of engagement.

Finally, the commander must understand that these estimates assume early detection of the threat, so that the first engagement occurs at the maximum effective range of the SAM system. When the enemy succeeds in compressing the battlespace using one or more of the tactics discussed throughout this manual, reaction time and the maximum number of AAW engagements are reduced considerably.

21.7 Summary

The AAW commander must constantly update the threat axis to reflect the most reliable intelligence available. In formation considerations, invest the time necessary to actually analyze the capability of

your own force's units. Balance resources between the outer and inner air battles, but strive to shoot the archer, not the arrow, whenever possible. Finally, station assets relative to the threat axis with Pk-biased weapons envelopes in mind. This tactic will increase your chances of living up to the Aegis motto: "If it flies, it dies."

22.0 Database

My rule is: If you meet the weakest vessel, attack; if it is a vessel equal to yours, attack; and if it is stronger than yours, also attack…
-Admiral Stepan O. Makarov

In *Harpoon 3™* context, the **database** is the information used to model all ships, aircraft, land facilities, mounts, weapons, and sensors in the game. The database can be edited with Jon Reimer's database builder using Microsoft Access. Many users have created their own databases, one of which is the DB2000.

The database is located in the 'Harpoon/Database' directory on Win32, and the ' *Harpoon 3™* /Resource/Annex Data' directory on Mac OS X. It consists of the files airfacil.dat, comm.dat, country.dat, facility.dat, fuel.dat, installa.dat, loadout.dat, magazine.dat, mount.dat, plane.dat, propuls.dat, sensor.dat, ship.dat, sub.dat, warhead.dat, weapon.dat and weaprec.dat. You would overwrite these files with their replacements from the DB2000 (after backing them up first, of course) if you wanted to use that database instead.

22.1 A Note About the Database

The *Harpoon 3™* database was designed with future expansion in mind. One of the great traumas in our lives was maintaining and expanding the database annexes used in Harpoon 1 BattleSets. In order to prevent this kind of dead-end approach from limiting our future growth with *Harpoon 3™*, we designed an object-oriented database with an intrinsic ability for expansion from the start. The database design is simple and elegant, and allows rapid update or expansion by letting us quickly add or modify new records. Additionally, whole new types of data can be added with minimal fuss. The modular design of *Harpoon 3™* in C++ allowed us to build a graphical database editor into the program, giving us a special version of *Harpoon 3™* which was both the game, scenario editor and a graphical database editor all in one. This valuable tool allows our staff researchers to create not only scenarios, but whole new BattleSets with record time and with minimal programmer support.

23.0 Scenarios

It's extremely difficult to second guess the American Navy, because the Americans rarely read their doctrine, and don't feel compelled to follow it when they do.
-Admiral of the Soviet Fleet Sergei Gorshkov

In *Harpoon 3™* you can play many Scenarios. The original download includes the tutorial scenarios as well as several different Battlesets If you use a Database that is different from the original *Harpoon 3™* database (such as the DB2000) you need to watch out that the scenario you are trying to load fits to the database.

23.1 Loading a Scenario

When you start *Harpoon 3™* the Scenario Selection screen will be displayed. If you want to play a stand-alone scenario click on Load file

24.0 Nav Zones

While appearing within our armed forces as an imposing factor in regard to restraining imperialist aggression and ventures, at the same time the Soviet Navy is a consolidator of international relations.
-Admiral of the Soviet Fleet Sergei Gorshkov

Navigation or "Nav" Zones are areas that you can designate as off-limits to all or some of your units. Nav Zones are used to prevent your units from navigating into areas because of threats, rules of engagement restrictions, or to avoid detection ranges of known enemy units or facilities. The following are the types of Nav Zones that may be created:

- A **Surface Threat Nav Zone** will exclude all surface ships from entering the zone. Aircraft and submarines are unaffected by this type of Nav Zone. You may create, modify, or delete this type of Nav Zone.
- A **Sub Threat Nav Zone** will exclude all submarines from entering the zone. Aircraft and ships are unaffected by this type of Nav Zone. You may create, modify, or delete this type of Nav Zone.
- An **Aircraft Threat Nav Zone** will exclude all aircraft from entering the zone. Submarines and ships are unaffected by this type of Nav Zone. You may create, modify, or delete this type of Nav Zone.
- A **General Exclusion Nav Zone** will exclude all units, aircraft, ships, and submarines, from entering the zone. You may create, modify, or delete this type of Nav Zone.
- **Neutral Nav Zones** are similar to a General Exclusion Nav Zone, a Neutral Nav Zone will exclude all units, aircraft, ships, and submarines, from entering the zone. You may NOT create, modify or delete a Neutral Nav Zone. Most Neutral Nav Zones will be created when the scenario is designed and will be present from the start of the scenario.

To display the various Nav Zones open the Map Preferences Window using the PREF toolbar button and select each one so an "X" appears in the boxes. We are now going to create a Nav Zone and see what effect it has on navigation.

24.1 Creating a Nav Zone

Prior to creating a Nav Zone, make sure that you have Nav Zones set to display from the Map Preference window. To create a Nav Zone start by clicking on the **Nav Zone toolbar button**. Your mouse cursor should change into a pencil cursor identical to the one used while in navigation mode. Place the mouse cursor at a point on an area of the map where you want the starting point of the Nav Zone to appear. Draw a polygon by clicking points on the map. Similar to drawing a course for a unit, line segments are created each time you click. When you reach the point where you are ready to close the polygon, click on the Nav Zone button again and the polygon will close automatically. A dialog box should appear with a variety of exclusion zones to choose from. Each type of exclusion zone listed has several lettered boxes next to it allowing you to create multiple versions of the same type of zone, each with its own letter designator. For Example, you could create to Ship Exclusion Zones, one would

be labeled “A”, while the other could be designated “B”. Select the type of zone you want and then click on the OK button. The line segments should change into one line making up the polygon with a small circle at the point where you first clicked to begin drawing the polygon. This circle is used to select the Nav Zone to edit or delete it.

24.2 Editing a Nav Zone

To edit a Nav Zone, select the circle that marks the starting point of the polygon. Note that when selected, the individual points you used to create the polygon appear. These polygon nodes can be moved and deleted exactly like the navigation waypoints. On the PC, double clicking on the **Nav Zone toolbar button** will bring up a dialog box with the Nav Zone exclusion options. Clicking once on the Nav Zone toolbar button changes the mouse cursor to the drawing pencil and allows you to lay in the points of a completely new Nav Zone.

24.3 Navigation Around Nav Zones

Affected units or groups will navigate around the Nav Zone in a manner similar to a ship or sub navigating around a land mass, unless you specifically set the unit or group to ignore that type of Nave Zone.

24.4 Navigation Through Nav Zones

You may require that a unit ignore a Nav Zone because it is critical for the successful completion of the mission to get to a spot inside. To navigate through the zone, start by selecting the unit or group that you want to navigate through the zone. Next, double-click on the Nav Zone toolbar button. The menu box used to designate Nav Zone types will appear with an “X” in every type of Nav Zone that the selected unit or group currently respects. Clear the “X” from the type of exclusion you wish the unit to ignore and press OK. The selected unit will now ignore any Nav Zone of the type that was cleared from the Nav Zone dialog box. If the polygon has other types selected, the unit may avoid a zone for those reasons. It is important to check and see if a polygon has multiple types before attempting to navigate through with the ignore feature. To restore the original settings for the selected unit, simply repeat the process and place an “X” in the box as it was before.
[edit]

24.5 Deleting a Nav Zone

To delete a Nav Zone, select the Nav Zone you wish to delete and then double-click the **Nav Zone toolbar button.** The Nav Zone type menu will appear again. Click on the “X” representing the selected Nav Zone type and remove it. This will delete the Selected Nav Zone.

25.0 Preferences

A good fighter pilot, like a good boxer, should have a knockout punch...You will find one attack you prefer to all others. Work on it till you can do it to perfection…then use it whenever possible.
- Captain Reade Tilley, USAAF.

25.1 Command-Line Options

You can use command-line options in *Harpoon 3™* to activate several additional options (Skipping the Intro, Auto Save, Show Weapons-calculations and error-logging). The different command line options are as follows:

Command Line	Effect
-?	Displays a list of valid command-line switches.
-a or **-A**	Auto Save. This will autosave the game every couple of minutes. The savegame will be called Auto.sav and is located in your *Harpoon 3™* directory. (3.7.0) The autosave file name is the name of the session ("Session" in SP) postpended with "-AUTOSAV".
-I<path>	Allows you to specify an alternate path to the *Harpoon 3™*.ini file (example: -IC:\ *Harpoon 3™* \ mylniDir)
-Ix or -Lx	Allows you to specify the maximum length of a simulation cycle in seconds. x must be an integral divisor of 15 (1,3,5 or 15), default is 15 (example: -L15). Formerly, the simulation would run in steps of the lesser of the selected time compression, or 15 seconds (the length of a paper-rules air phase). This switch allows you to set a lower ceiling on the size of the time step, making the simulation more precise but possibly slower.
-s<section> or -S<section>	Allows you do select an alternate section of the *Harpoon 3™*.ini file to override settings in the default section. Example below.
-t or -T	Skip Intro. This will load *Harpoon 3™* without displaying the Intro-animation
-v<mode>	Override the *Harpoon 3™*.ini vide setting. <mode> is the VESA mode corresponding to the resolution you wish to use. See table below for valid settings.
-V	Display the version information for the executable.
-w or -W	Show Weapons Calculations. This will display the weapons calculations in the Incoming Messages window

25.1.1 Using Multiple Command Line Arguments

You can combine the different command line options by simply adding them in the end. harpoon3.exe -t -a for example will skip the intro and make autosaves. You might want to create a .bat file with the command line options so you don't have to open a DOS-window to start *Harpoon 3™*.
INI file section example:

If your .ini file contained the following lines:

[OTHERDB]
ScenarioDir C:\Harpoon3\OtherDB\Scenarios
AnnexDir C:\Harpoon3\OtherDB\Database
And you ran Harpoon with the
-SOTHERDB

…the program would use the above directories instead of the ones in the [HARPOON3] section, allowing you to switch database and scenario sets without having to edit the .ini file.

VESA modes for use with –v:

VESA Mode	**Resolution**
101	640 x 480
103	800 x 600
105	1024 x 768
107	1280 x 1024

25.2 .OPT-Files

The second mechanism of change within the game are the option files (.opt). AGSI has included these files with the current build of the simulation to allow you to turn certain features on and off. If you look within your *Harpoon 3™* directory (C:\harpoon3) you will see a folder named options (C:\harpoon3\options). Within that folder you will see a folder named disabled (C:\harpoon3\options\disabled) and in each you will find the files that correspond to each available option which I will describe in detail below. To activate options you simply leave the corresponding files in the option folder. To deactivate options you move the corresponding file to the disabled folder.

File Name	**Description**
AALog.opt	This file enables usage of the After-Action Log, that will be written in the "AA logs" folder (C:\harpoon3\AALogs) when activated.
DSCFixThermalLayer.opt	This file fixes an earlier bug from H2. The thermal layer is now at the correct depth. **This option should always be activated.** (3.7.0) This option is defunct in 3.7.0, the broken code has been removed so you no longer have the option of using it.

DSCNo3Xeyeballs.opt	This file fixes a problem with optical sensors. **Only use this option with the original Database. DO NOT USE IT WHEN USING THE DB2000 DATABSE!!!** (3.7.0) This option is defunct in 3.7.0, the broken code has been removed so you no longer have the option of using it.
DSCNoRandomFringeRadar.opt	This option fixes a bug that existed with radar fringe ranges. **This option should always be activated.** (3.7.0) This option is defunct in 3.7.0, the broken code has been removed so you no longer have the option of using it.
ExtrashortPointDefense.opt	This option provides a little extra information about point defense, but keeps the messages short to just tip off the player that certain things are being used. (ex. You will see the worlds "buzz" or "zap" when various types of ECM are being used).
ExtraVerbosePointDefense.opt	Allows every computation involved in point defense to be included in the AA log.
Moviemaker.opt	This file enables the auto-screengrab feature. Edit the MovieTime.txt-file to change the time between auto-screengrabs.
RuninWindow.opt	This file allows *Harpoon 3™* to be run in a window rather than full screen mode.
ShowPointDefense.opt	This prints out some basic information to the AAlog and must be active for ExtraShortPointDefense.opt and ExtraVerbosePointDefense.opt to work.
UseNukes.opt	This file grants nuclear release. **This option should only be used in scenarios designed for nuclear exchange.**

VerboseWeaponDetection.opt

If you have this option enabled you will receive extra feedback about weapon detections and targeting. You must have the AA Log option enabled or be in watch mode.

25.3 Harpoon3.ini

For maximum commonality with Harpoon II for MS-DOS, *Harpoon 3™* uses a separate set-up file (an INI file). While Harpoon II had a program that edited this file for you, *Harpoon 3™* doesn't due to incompatibilities of this program with Windows NT-based systems. (The file itself is a plain text file, so perhaps some nice programmer with some free time will write a simple graphical program to edit it).

The name of the set-up file is Harpoon 3.INI. The first time you launch *Harpoon 3™*, it will automatically create this file for you. This file has many settings that tell *Harpoon 3™* where to look for certain parts of the game. For example the Harpoon 3.ini file tells the game where movies are stored. It is strongly suggested that you always BACK UP your Harpoon 3.ini file before making any changes. Many of the features you can set in Harpoon 3.ini are also configurable in the game. However the game does not currently save those settings when you quit. Eventually, the game should automatically update this file for you when you quit.

VERY IMPORTANT: Before editing the Harpoon 3.ini file, please note that the order of the entries is critical. Do not reorder them, or remove them, or add in extra entries. I would like to rewrite this whole system some day so it's a lot less fussy, but it's not at the top of my list of things to do.

Harpoon3.INI File Details: This is an explanation of the Harpoon3.ini file section by section.

```
; ================================
; Super VGA Modes Supported
; ================================
;   101          640 x  480 x 256
    103          800 x  600 x 256
;   105         1024 x  768 x 256
;   107         1280 x 1024 x 256
;
;  Anything other than one of the
;  listed modes results in the
;  screen resolution set to 101
; ================================

;SVGAMode 103
```

The first item you will see is your display options. As you can see this simply is a listing of possible display modes of computer. 800 by 600 is the default but you may change as desired. Note that if you run *Harpoon 3™* in window-mode you can only choose screen-resolutions 1 level below your current desktop screen-resolution.

```
; ========================================
; Sound Directives
; ========================================
;    0       No Sound
;    1       Voice only
;    2       Music only
;    3       Voice and Music only
;    4       F/X only
;    5       Voice and F/X only
;    6       F/X and Music only
;    7       Voice, F/X and Music
; ========================================
Sound 6
```

The next section of the ini deals with your sound options. This is fairly self-explanatory and works the same as the above mentioned section of the ini. You simply replace the value after sound to suit your needs. Keep in mind the voices are neat but Jesse is no Barry White. I suggest you turn these off particularly in larger scenarios as you may get many Vampire calls concurrently.

You can change this setting in the Game Preferences screen; however, it does not currently save them when you quit.

```
; ========================================
; Animation Settings: Can be set to ON or OFF
; ========================================

Animations   ON

; ========================================
; Animation window persistence, may be on or off
; ========================================

AnimationPersist    OFF

; ========================================
; If Animations are set to ON, the following settings
; may be specified.  If Animations are set to OFF,
; these items are always off in the game, no matter
; what the following settings are.
; ========================================

WeaponLaunch   ON

WeaponHit   ON

PlaneLaunch   OFF

PlaneLand    OFF

PointDefense   OFF
```

The next section of the Ini has to do with the Animation settings. The Animation settings are the little movies that are displayed when certain actions take place in the game. As you can see you have a wide range of settings to play with in this section of the file. The first section, Animations, is a general setting which allows you to turn them all on or off. If you do not wish to have any animations, you simply set this one to off and your job is done. If you wish to keep them on with changes you must work through the rest of the section. Animation persist simply gives you the option to allow the animation to remain on your screen until you turn it off or not. Finally, the last five options gives you control of each animation individually.

You can change this setting in the Game Preferences screen; however, it does not currently save them when you quit.

```
; ========================================
; Aircraft Logistics Setting
; Set this variable to ON if you want to limit
; the number of aircraft weapons available to
; the contents of the parent unit's magazines
; ========================================

AircraftLogistics   ON
```

The next section of the ini covers aircraft logistics which is fairly important to most players. The basic premise behind this one is giving yourself an option of limited ammunition with your aircraft or unlimited. You choose "ON" to enforce aircraft logistics and "OFF" to ignore them.

```
; ========================================
; Class Restrictions - Scenario Editor Only
;
; Set ClassRestrictionByCountry ON if you wish
; to limit the classes available to ones used
; by the selected country.
;
; Set ClassRestrictionByTime ON if you ALSO wish
; to limit selection to classes and individual
; units which were historically in service that
; year.  This option only works if
; Class RestrictionsByCountry is set ON.
; ========================================

ClassRestrictionByCountry   OFF

ClassRestrictionByTime   OFF
```

Next we've got a section designed for scenario writers only called Class Restriction. What these do is allow the scenario editor to view the database only by class or year. Changing these values is simply done by change the default values from "OFF" to "ON". When you turn "Class Restriction by Country" to On and then access the scenario editor and choose to add a unit a list of nations is produced from the country file. When you select the desired country a list of its platforms will be produced for you to select. When you turn "Class Restriction by Time" on and then access the editor you will be given a selection based on the date you've chosen when first creating the scenario.

The DB2000 does not support the country file so these options will not function properly. This function will work with the default database, however.

```
; ========================================
; Load Scenario file extension
; ========================================

LoadList              *.SCN,*.SAV

; ========================================
; Save Scenario file extension
; ========================================

SaveList              *.SAV
```

The SaveList entry is replaced by the following two entries:

```
; ========================================
; Save Game file extension (used by game)
; ========================================

SaveGameList              *.SAV

; ========================================
; Save Scenario file extension (used by editor)
; ========================================

SaveScenarioList    *.SCN
```

The next section is allows you to change the default extensions for harpoon to load and save scenarios and games. These options are change by simply editing the extensions listed in the file.

```
; ========================================
; Directories where resource files are stored
; ========================================

ResDirCount           3

ResDir1               C:\Harpoon3\resource

ResDir2               C:\Harpoon3\sound

ResDir3               C:\Harpoon3\dat2

; ========================================
; Directory where startup music is found
; ========================================

MusicDir              C:\Harpoon3\resource

; ========================================
```

```
; Directory where intro animation is found
; ========================================

IntroDir              C:\Harpoon3\resource

; ========================================
; Directory where runtime animations are found
; ========================================

AnimDir               C:\Harpoon3\video

; ========================================
; Directory where map data is stored
; ========================================

MapDir                C:\Harpoon3\mapdata

; ========================================
; Directory where scenerio data is stored
; ========================================

ScenarioDir           C:\Harpoon3\battlset

; ========================================
; Directory where annex data is stored
; ========================================

AnnexDir              C:\Harpoon3\database

; ========================================
; Directory where doctrine tables are stored
; ========================================

DoctrineDir           C:\Harpoon3\doctrine

; ========================================
; Scenario creator scratch file
; ========================================

ScratchFile           C:\Harpoon3\scratch.map

; ========================================
; Palette save file
; ========================================

Palette               C:\Harpoon3\resource\default.pal

; ========================================
; Default Palettes file
; ========================================
```

```
DefaultPalettes       C:\Harpoon3\resource\pal.bin
```

The next set of options really should be left alone except under certain circumstances. The only options that would be a concern to any player are the res, dat and dat2 locations. These must be changed when using other databases. The database writers should include a detailed file explaining how to change these values correctly with any database release. The DB2000 and default database do not require you to change a thing, which means that these values should be left alone.

```
; ========================================
; Map Preferences
;
;        1  Show coastlines (should ALWAYS be on)
;        2  Show international borders
;        4  Show ice caps
;        8  Show land
;       16  Show water
;       32  Show data blocks
;       64  Show ice pack
;      128  Show unit paths
;      256  Show groups
;      512  Show sonobuoys
;     1024  Show current unit data block
;     2048  Show current unit path
;    32768  Show reference points
;    65536  Show communication networks
;   131072  Show wind data
;   262144  Show cloud data
;   524288  Show precipitation data
;  1048576  Show surface threat zones
;  2097152  Show submarine threat zones
;  4194304  Show air threat zones
;  8388608  Show restricted navigation zones
; 16777216  Show neutral zones
;
; Add the values for the features you wish
; to have displayed
; ========================================

MapPreferences 15830273
```

The next set of editable options in the ini are the map options. As you can see a bit of math is required to get your desired result. It is worth noting that you can change these options within the game however, they will only work for your current game. The default value is suggested, as adding anymore may clutter your map.

You can change this setting in the Map Preferences screen; however, it does not currently save them when you quit.

```
; ========================================
; Map Lat,Lon Line Increment
; Lat,Lon lines can be added at 1,5, or 10 degree intervals.
; A zero for this value will turn the lines off.
; ========================================

LatLonIncrement   0
```

This next section deals with displaying latitude and longitude lines on your map. Again this information can be set within the game, but in that case you will need to set them each time you play the game. You can change this setting in the game (under Map Preferences), however it does not currently save them when you quit.

```
; ========================================
; Realism levels:
;  0                    Full realism
;  1                    Auto DataLinks
;  3                    Instant Side ID
;  7                    Instant Unit ID
;  15                   Instant Detect
;
; Automatic networks gives the user instant communication
; with all units on his side that have communications
equipment.
; Instant side ID gives you the allegiance of all contacts.
; Instant Unit ID automatically classifies contacts.
; Instant detect will show you all units in the game.
; ========================================

RealismLevel    1
```

This next value in the ini allows you to change the difficulty settings in the game. This is of particular interest to all those wondering why they can't communicate with their subs. As mentioned in the description there are five settings to chose from which are: full realism, auto data links, instant side ID, Instant Unit ID and Instant Detect.

Full realism will enforce communications rules. Meaning if you have units which leave the communication threshold you will not be able to issue them orders until they enter that threshold once again. Submarines are the best examples and will only surface to communicate when they reach waypoints.

Auto Datalinks allows you to communicate with units that have left the communication threshold. Most players of this game utilize this setting as it allows them the most control while still maintaining some degree of reality.

- **Instant side ID** gives you the ability to know the contact's side identification on contact.
- **Instant unit ID** gives you the ability to know a contacts identity on contact.
- **Instant Detect** gives you omnipotence as you will see everything on your map.

```
; ========================================
```

```
; Executive Officer Box Popup preference
; Add values for the following popups
; New Contact                    4
; Contact Change                 8
; Hit or sunk ship              16
; General Information           32
; ======================================

ExecutiveOfficerBoxAppears    16
```

The next setting is the Executive Officer Popup Box Preference option. You simply add the values of the options you would like to include to activate each popup. Keep in mind that all of this information displayed by the popup is displayed in your message box within the game. Only select those you feel that you would need as the popups can become cumbersome. I especially advise you to make sure that you leave the new contact popup out of your game as the start of your game could flood your screen with them.

You can change this setting in the Game Preferences screen; however, it does not currently save them when you quit.

```
; ======================================
; The following preference is for the
; amount of assistance the AI gives the human
; player. The bits in the value are assigned as
; follows
;
;  Navigate paths                1
;  Allocate weapons              2
;  Assign threat axes            16
;  Default formations            32
;  Manage Air Assets             64
; ======================================

ExecutiveOfficerAssistance    19
```

The next option is the executive officer assistance selection. You simply add the values of the options you would like to include to activate each options. There are five which are Navigate Paths, Allocate Weapons, Assign threat axes, default formations and manage air assets.

The Navigate paths, Allocate weapons and assign threat axes are fairly self explanatory and must for those who do not wish to spend a lot of time micromanaging their formations.

Default formations set fixed formations within the formation editor. You can change them but if they are not set the AI will assign a standard formation which is suitable but may not be exactly what most harpooners would use.

Finally, the Manage Air Assets selection gives the computer control over the air assets within your formation. It will assign all variants of the missions offered in the formation editor. It is highly advised you turn this option off as it is not the best manager of your air assets. It will often take aircraft that you would use for your missions and is anything but efficient.

You can change this setting in the Game Preferences screen; however, it does not currently save them when you quit.

```
; ======================================
; Selects the size of the button on the
; map/zoom window's toolbar.
;
; Values are:
;    Small       0
;    Medium      1
;    Large       2
; ======================================

ButtonSize    1
```

The next selection in the ini file allows you to adjust the size of the buttons that are displayed on your map window within the game.

```
; ======================================
; Selects the type of icons that will be
; displayed on the map/zoom windows.
;
; Values are:
;    NTDS        0
;    Stylized    1
; ======================================

SymbolSet     0
```

The next option in the ini file is the symbol set option. This selection allows you to change the unit Icons within the game. The NTDS (Navy Tactical Data System) symbols are the standard symbols used in military circles. The Stylized icons look like the units they are depicting.

You can change this setting in the Settings pull-down menu; however, it does not currently save them when you quit.

```
; ======================================
; Mouse Acceleration
; 2 is the default
; larger values slow down the mouse
; 1 is faster
; ======================================

MouseSpeed    2
```

The final selection is the mouse speed selection. To change this setting you simply edit to value to match the mouse speed you would like.

25.4 Harpoon 3 ANW additions to the .ini

Since B130 or later any directory can also be specified as relative to the directory the program is started from by starting with ".\". For example: If the program is started from "C:\Harpoon3" and a directory entry in the .ini file reads ".\resource" the program will use "C:\Harpoon3\resource" for that path.

```
;=======================================
; Multiplayer Connection Info
; ServerIP is the IP address for the game server (not used by
the game server itself)
; ServerPort is the IP listening port for the game server
; PlayerName is the name to use as the players handle in the
game
;=======================================
ServerName            BIGJP
ServerIP              127.0.0.1
ServerPort            14342
PlayerName            LITTLEJP
VCRout                OFF
```

These are the multiplayer settings of *Harpoon 3™* ANW. Server name is only important when you are planning to run your own server. Give it any name you want :) ServerIP on the other hand is only important when you want to connedt to another server. You will need to find out the IP of the computer where the server is run. Usually the player that sets up the server will tell you the IP. If you are planning to run the server and client on the same machine use 127.0.0.1 as IP. The server port is 14342 as default and most people that run a server will leave it at that setting. PlayerName is pretty straightforward, that's your name. VCRout is the toggle switch for the VCR feature included in Harpoon3 ANW. VCR files will be saved to your scenario folder if it is activated.

```
; =======================================
; Default Window Scheme
; =======================================
WindowScheme      D:\Harpoon 3 ANW\DEFAULT.SCH
```

Harpoon 3™ ANW allows you to specify a default window scheme that is applied when you load a scenario if you have the little checkbox at the scenario load screen checked.

```
;=======================================
;MP  Chat Logging Settings
;MPLogging  ON|OFF
;MPLogDir   e.g.   c:\Harpoon 3 ANW\MPlogs
; =======================================
MPLogging             ON
MPLogDir              .\MPlogs
```

These settings allow you to specify a folder where the Multiplayer chat logs will be saved and toggle the logging of the chat on and off. This feature is implemented since B130 or later.

26.0 Technical Notes

You speak of aircraft carriers and of the construction of new types of ships…while at the same time completely ignoring the economic situation of our country and the corresponding conditions of our technical means…
-V.I. Zov, Soviet Naval Commissar, addressing the Soviet Naval Academy

26.1 Propulsion

While some of the weapons and platforms in *Harpoon 3™* share common propulsion systems, most do not. To simulate the vastly different operating parameters and performance of all these different engines, boosters, batteries, rockets, etc. we keep an extensive data- base on all the propulsion systems used in *Harpoon 3™*. We track the name and type, as well as valid fuels and consumption rates for each system. Each propulsion system may have many different operating altitudes, each offering different speeds and consumption coefficients. This is one area where object oriented programming helped immensely while writing *Harpoon 3™*. Every mobile platform in the simulation contains a propulsion system (or perhaps more than one). These propulsion systems know what type of fuel they can utilize and how fast they will consume it. Since each platform also carries around appropriate quantities of the fuels it expects to use, things work well. These layered models allowed us to simulate UNREP (underway replenishment) and air-to-air refueling with relative ease. In one test run, we found a ship with a voracious gas turbine engine, which, when all of its fuel was gone, started in on the fuel stores for its embarked helicopters. The gas turbines used by this ship really were capable of efficiently burning almost anything, and thought the helo fuel would make a lovely dessert.

26.2 Weapons

One of the trickiest pieces of modeling we did in *Harpoon 3™* was the employment of semi-active radar homing missiles (SARH) which, due to engagement geometry, were forced to share illuminators. It was a simple enough problem when confined to illuminate-all-the-way missiles, but several real missile systems had inertial/command guided fly out and only required illumination in the terminal phase of their flight. This meant we had to keep track of when each director would be busy (in the future) and prevent a missile from firing if no directors would be available at the intercept time. So each director/illuminator got a rolling bit field representing a 15 second engagement slice of time and we wrote a simple timesharing system to keep the launchers honest.

When you also consider that each mount has a rate-of-fire (ROF) cycle and finite reload time, the whole affair has suddenly grown beyond the user's ability to effectively micro-manage. In real life, a trained Air Warfare Officer and his crew will have a very hard time keeping up with the multi-dimensional geometry of even the simplest engagements. Since the average *Harpoon 3™* player would probably have even less training, we had to let the computer handle a lot of the functionality for them. The design paradigm of *Harpoon 3™* states clearly that "Once the missiles start to fly, the user is mostly out of the loop". While this may be less fun than shooting each missile yourself (a la most flight simulators), the emphasis is really on learning about and employing modern naval tactics, and not how quick your mouse hand reflexes are.

In real life, a semi-active radar homing (SARH) missile tracks reflected microwave energy that has bounced off its intended target. This energy usually originates from an 'illuminator'. An illuminator is a generally a radar emitter that produces a tight microwave beam used to guide a SARH missile. A typical missile engagement using SARH missiles would probably go like this: A search radar will detect

a target and tell the illuminator where to point. The illuminator then emits a microwave beam which reaches out to the target. Some of the energy bounces off the target and is visible to the radar seeker head in the missile (which is still on the rails). The missile says to the fire control computers "I can see the reflected energy". The missile is fired towards the target and will steer itself towards the reflected energy, eventually intercepting the target and exploding. If the illuminator is turned off for some reason, the missile will no longer see any reflected energy and will miss the target. Some missiles will self-destruct when they lose their illumination. There are some problems with this system. First, the illuminator must be constantly pointed at the target during the entire flight of the outbound missile. This means you may only shoot at as many targets as you have directors to guide them.

Some missiles and torpedoes employ search patterns in the terminal phase of delivery. This means if they do not see an appropriate target when they have reached their activation point, they will alter their course to search for one. Missiles and sub-launched torpedoes will initiate an expanding 'snake' pattern, which makes the weapon simply zigzag back and forth every few minutes by about 45 degrees left and right of its base course. In contrast, aerial delivered torpedoes launched at uncertain submarine contacts will almost always begin an expanding circle pattern (a spiral), occasionally changing depths in its search for a submarine. Care must be taken not to launch at an uncertain target in an area where friendly or neutral platforms might be spotted by the weapon's seeker head. The weapon cannot tell friend from foe or combatant from civilian and will engage any platform matching its target parameters.

Air-delivered gravity bombs may be tossed ballistically. This means that the higher and faster an aircraft is flying, the greater the distance from the target the bomb can be released. This allows aircraft to avoid heavy concentrations of point defense weapons (like handheld SAM launchers and small arms fire).

26.3 Maps

We are especially proud of the maps in *Harpoon 3™*. While we could have produced a pretty bitmap for you to look at, we chose to not imitate the Rand-McNally™ Atlas look and feel. Instead we looked at how a variety of actual tactical systems displayed topographic and bathymetric data and went for realism instead. Additionally, vector maps offered free scaling and sizing without any data loss, and gave us any projection type we were willing to write math for. Since those addressed two of the major limitations with the maps in the original *Harpoon*, we elected to implement maps in this fashion.

After much research and heart-ache, we discovered no one source for global vector map data that met all of our needs, so we had to settle on several different sources. We wrote many conversion and integration programs and finally developed a base set which we could work from. Then came the corrections; a quick check revealed glaring inaccuracies in much of the original data so we had to compare (by hand) much of it using high resolution survey maps and charts. Eventually a composite database arose that contained integrated data from the following sources; The Defense Mapping Agency, The Central Intelligence Agency, The National Oceanic and Atmospheric Administration, The National Geophysical Data Center, The Governments of Great Britain, Canada, and Australia. The polygon data represented coastal points on a 1000 yard scale for the entire planet and topographic and hydro/bathymetric datapoints every 30 miles (at the equator). Our internal data structures also yielded lookup and render times several orders of magnitude faster than those provided by the original data sources. This map scale fit in nicely with our basic internal unit of distance in *Harpoon 3™* (about 18" apart) and allows us as fine a resolution of detail as could be desired.

27.0 Scenario Design

Men of sense often learn from their enemies. It is from their foes, not their friends, that cities learn the lesson of building high walls and ships of war.
-Aristophanes

27.1 Modeling Collateral Damage

Growing importance of the media in the coverage of wars has led the US military to adopt a new concept known as "surgical strikes." In opposition to carpet bombings of World War II, surgical strikes are made with "smart weapons," able to guide themselves towards their targets.

During the Gulf War, roughly 10% of the ordnance used was "Precision-Guided Munitions" (PGMs). Twelve years later, for Operation Iraqi Freedom, the percentage had risen to 90%. PGMs have allowed the reduction of the risk on population living in the vicinity of military facilities, one key target in case of air campaign. Loss of live or property caused by mistakes in the choice of targets or failures in the guidance system is known as "collateral damage". These can be implemented in *Harpoon 3™* as well.

Let's imagine a scenario taking place in Southern Iraq, in March 2003. There are Rumalah oil fields (derricks, pumping and storage facilities). These are belonging to a side called "neutrals/civilians". If Iraqi Army units are stationed less than 1 mile from civilian facilities, there's a risk that the latter may be hit as well in case of strike against the military unit.

Using cluster ammo proves highly hazardous to the neutral units in the area, since cluster ammo is considered as an area-suppression weapon. So "non-spreading" ammo would maybe suit in case of neutral units close to military units. In fact, this is partly true. Warhead matters most.

If the warhead is a powerful one, the blast will spread to nearby structures/units, damaging them somehow. You'll be notified of this when the evaluation comes at the end of the scenario: "You're facing court martial because unit X fired a weapon Y on the unit Z".

For a scenario designer, this feature can be very interesting to use. Let's go back to our Iraqi scenario example. The overall goal of Coalition forces being to keep structures intact for a faster rebuilding of Iraq, a Victory condition reveals itself as particularly hard to achieve: -Protect unit: Type/subtype/class/unitname In this case, this would be: Protect unit: Facility/oil well (+the number of oil wells you want to protect) Say you have 4 oil wells "protected" out of 4. If one is destroyed, you loose the scenario.

Things can be even more difficult because the scenario designer is able to set the damage level to less than 100 (1% damage could be a tough Victory Condition to respect).

OK, now the choice is yours. Either you choose carefully your loadouts considering the environment, or you can prepare yourself to say something like "Sorry to the victims' families…" If you are scenario designer and you want to make things spicier for the players, it can always be a new Victory Condition to add to your list.

27.2 Centralized Integrated Air Defense Systems and How to Construct Them in Harpoon 3

27.2.1 What is a Centralized Integrated Air Defense System (IADS)?

A centralized IADS is a network of grouped sensors and air defense equipment that are interconnected via centralized Command and Control centers. Each group of sensors and equipment is responsible for its own area of airspace. They report their findings to a centralized Command and Control (C2) center which in turn will report the data and issue commands to the reporting group all other air defense groups which need to know, in order to defend efficiently and effectively a nation's aerospace.

The Soviet Union/Russia and most client nations used this type of system throughout the Cold War. Given the vast territorial expanses needed to defend, and the sheer number of air defense equipment, these systems served these nations well. Historical successes include Vietnam, the Middle East in 1973, and the downing of numerous NATO aircraft (mainly spy flights) throughout the Cold War. The Gulf War stopped the impressive career streak of these systems, as Coalition forces were quick to destroy the Iraqi KARI system (a combination of exported Soviet and French systems), allowing complete air dominance over Iraq.

Many nations still use this system today, including North Korea, Syria, Iran, and other nations that depend on Cold War-era equipment. Most nations have attempted to improve their systems after the collapse of the Iraqi system in the first Gulf War but given the cost and logistics of such an endeavor many nations' air defense systems are still very centralized. There are also several NATO block or Western Allied members that use a centralized system structure, but they have had the resources to address the shortcomings of the system and capitalize on its strengths. These systems are thus still relevant to the world today, and their proper modeling in a high-fidelity simulation like Harpoon is thus of good use.

27.2.2 What are the Advantages of Centralized IADS?

The most obvious advantage is that the host nation will have multiple sources of information going to specific centers of command and control which can sort out the information and issue orders to each part of the system to effectively respond to any event. The second advantage is that a sensor in one part of the country does not have to be in range to know what is going on in another part of the country. The central node has reported the information and the appropriate action for this sector to take to effectively respond to an event.

27.2.3 What are the Disadvantages of a Centralized IADS?

The disadvantages are that if the centralized command and control centers or communications are disrupted (or destroyed) the system becomes paralyzed, because each individual group is dependent on the command center above it. Data and commands no longer flow from one end of the air defense network to the other. This was proven during the first Gulf War, when Coalition forces specifically targeted command nodes of the Iraqi KARI air defense system. Billions of dollars of good air defense equipment (mostly French C3I nodes and export-Soviet radars & SAMs) became far less effective, and in some cases paralyzed, allowing Coalition air power superiority already several hours into the war and throughout the conflict.

27.2.4 Can You Really Implement this in Harpoon 3?

Harpoon 3™ is well suited to model this type of network. Communications are modeled in the simulation, through the use of data-links and multiple side postures. Data-links are simply lines of communications between one unit and another. These are established by having communication-type equipment listed within their database entries. Postures are relationship settings that can be given to each side of play. They can be set to friendly, neutral and hostile. These settings do not just exist to specify who fights who (or not), but they also dictate communication relationships between each side. Specifically, sides that are specified as friendly to another will share its sensor data to the side it is friendly to. Likewise, if the side is set as neutral or hostile it will not share the data. Given that you can create many sides with different postures, it is possible to create a relationship tree resembling a centralized IADS.

27.2.5 Why should I Implement This in My Scenarios?

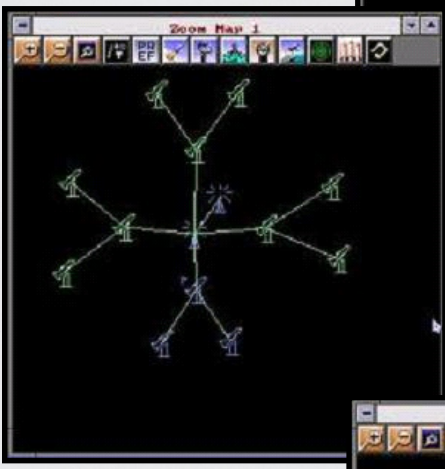
Simply put, to model reality. But the most important reason is that you are giving your scenario players a greater reward (or penalty) than merely a destroyed facility or platform. If the player intelligently picks his targets, he may be able to shut down an air defense system or sector entirely, which is a much more gratifying experience than simply destroying a single SAM. Likewise, the player's air defense network can be shut down the same way, thus presenting a clear challenge (new headaches!) for the player. It is an implementation which really lends itself to a good modern wargaming experience.

27.2.6 How do I implement a Centralized IADS in Harpoon 3?

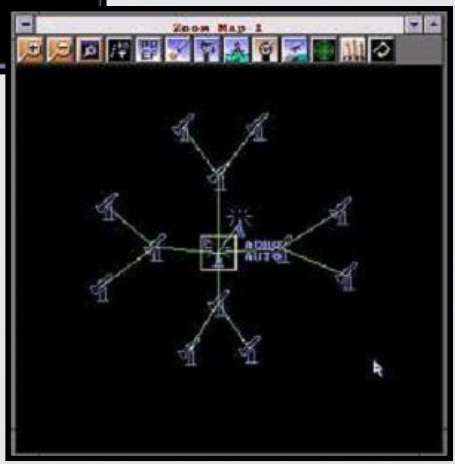
Implementation is achieved by breaking down the air defense system into different sides, based on logical geographic or hierarchical groupings, and using postures to dictate the communication levels they have with each other. I have created an example with a simple fictional centralized IADS around the city of Bangladore, India to show how this is achieved.

First I conceive a simple centralized IADS system for Bangladore. I believe one central command center is appropriate for the city with one long range EW radar attached. I then think four subsectors based on their geographic arrangement (North, South, East, West) around the city should be appropriate and create a side for each. Each subsector will include one SA-3 Regimental HQ unit and two SA-3 battalions.

Next, I need to establish relationships between each side to properly model a centralized network. I know that the Southern Air Defense Command Air defense headquarters (ADHQ) is my central node, and thus should communicate will all subsectors and all subsectors should be able to communicate with it. To accomplish this, I set a "friendly" posture to all sectors and I set each sector side friendly to it. I also know that, in order for the network to be centralized, none of the subsectors cannot talk to each other. To accomplish this, I leave their postures at "neutral".



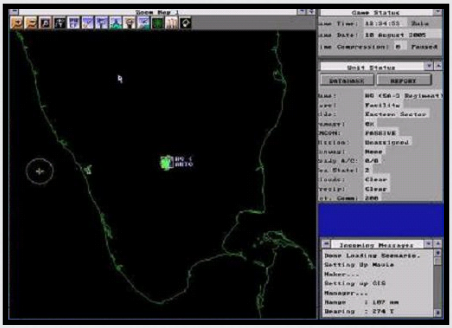
I now have properly implemented a simple Centralized IADS. Looking at the screenshots you can see that each sub-sector components have datalinks that point to each respective sector HQ. Each respective sector HQ then points to the central command center node.



27.2.7 Enough Already, Test It and Show Me It Works!

In this example I have moved the western sector HQ west out of the range of the other sector's radars, so they do not see what the western sector HQ can see. I then inserted a "bogey" side, assigned a single B-1B bomber to it and tasked it to head east. I then switched sides to the Eastern sector side and waited to see if I would receive a contact report from the western sector. At 12.24:04 I received my first contact report. The bogey was seen by the Western Sector's radars, and the report was passed through the central node and on to my current side, the Eastern Sector. It works!

Okay, now what happens when the Command Side is destroyed and all the links are broken between the sectors?



As you can see, the contact becomes lost as the Western sector no longer has a means to communicate with the Eastern Sector. All benefits of the interconnected IADS have been lost and any bogie will now have a greater chance of successful penetration, as the component parts of the IADS are not communicating.

This was a very simple example, but you can build a huge and complex network using these principles. Just remember to break the system down into different sides and make sure that you use postures correctly. The command side posture is friendly to every sector and every sector friendly to it. Each sector is friendly to the command side but neutral to each other. The Central Node is friendly

to everybody, and every sector is friendly to it. Each Sector is friendly to the Central Node but Neutral to all others.

27.2.8 Any Known Scenario Oddities That Can Occur Using This Method?

There is one oddity but it should be very rare. In the instance that you have friendly aircraft sharing aerospace with a hostile that is being engaged, it is possible that the friendly may interpret the friendly attack as being itself attacked. The result would be the assumption of a hostile posture. Careful planning and management can prevent this. In most cases it would be very rare for this to happen. Okay that's it, enjoy!

28.0 Scenario Design Checklist

A ship-of-war is the best ambassador.
-Oliver Cromwell

28.1 Introduction

Is it realistic? Scenarios set in a hypothetical future are not necessarily a problem, but the scenario will demand more work at this stage. For instance a "realistic" scenario with reference to the Falklands could simply mention that it was known that no SSN was patrolling the area in 1982, this scenario examines what difference one would have made.

I would argue that that as an intro would pretty much suffice. However if you are instead writing an alternative history based on say Argentina receiving Russian equipment, then you need to write a good deal more to orientate the player. At the very least warn them of what to expect.

28.2 Sides

Have you set the playable sides to be playable, have postures been set and do they work? If the player side sails around without taking any action will the AI eventually attack at all? Under the sides have you included full orders, and will the player be able to follow them. For instance if the target is to reach point X or supply base Y , are these clearly shown on their map?

Consider adding Neutrals as a side but with a health warning, each added side slows the game down so for larger scenarios be wary of adding any. Don't add Noise on the same side as Neutrals. You can expect a player to legitimately attack a false contact, but if all neutrals then turn hostile things look very odd.

28.3 Ships

By this I mean add the relevant units. Rename them with the correct name and pennant number ideally. Add helicopters if available to that unit. Is your ORBAT correct? Again if adding ships not available to this side cover that in the intro.

28.4 Formations

Set up realistic formations. This is to be fair a difficult subject. The default formation uses a circle whereas for formation construction you will need to assign square sectors most likely.

When units are placed they always head due North and will stay that way until game start. We personally find the easiest is to draw out the formation with added reference points for each vessel. Then move your units onto the points. You can check the spacing with clicking if the range setting is on. Once each is where you want it drag select and group the units.

Now use the formation editor to assign each unit a patrol zone where it already is. Use sprint drift for sub hunters and towed arrays in the outer ASW defenses, otherwise assign by Station or Random. Random is helpful for a looser formation and cuts down on CPU usage if operating around channels/islands etc. For units that you want to stay in a tight formation use small square boxes for the patrol zone. Although we say square you will find in certain areas you can only in fact draw a diamond shape.

You can check for this later by running the formation at one minute and seeing whether any units are constantly moving course. If you have a formation that will only run at half speed you almost certainly have this bug. (If it is present expect to click on each unit while in formation editor and at one minute you should see those that are re-plotting, they effectively flash through course changes). If setting up a very large formation it sometimes helps to add a unit and plot a course with it. Say you want an eight-ship group four deep and want it to be a deep rectangle, then all you do is plot a course with the dummy ship around your reference points. You can then drag the waypoints until you have straight lines. This should tell you whether your ships/mission points need moving.

28.5 Formation Name

Once formed, you will need to name the formation. If you can use an actual name (a difficult piece of research) then so much the better. Once all set you can now move the formation without starting the game up. Simply select move unit and move the whole formation.

28.6 Emcon

Set Emcon states for ships and any land units you are using. Using the intermittent setting for the AI is often useful. Consider setting up patrol zones for AEW and Dipping Sonar if available. However be sure to leave sufficient for strike missions and do not use sonobuoy patrols which are mostly ineffective.

28.7 Land

Add airbases if required. Ensure they are in the correct place and contain the correct type available. There are several good internet based resources for this. If the bases are not to be attacked consider using a generic base like the remote airbase in DB2000. However ensure the player cannot attack these and knows they are not a target. If the bases can be attacked form them up from the relevant facilities. You should ideally use the smaller facilities rather than large hangar complexes. For example use the 4 times hangar types.

How spread out are the airbases? Check this with the range setting otherwise they will end up unrealistically spread out.

When you come to allocating aircraft, add them to the hangar rather than the base. Adding to the base will cause some hangars to fill up and overrun. In the example above a typical allocation might be 8 aircraft for each hangar group . 8 also works fairly well with air patrols, use 6 to set up a two aircraft patrol (using 1/3 allocation) while 2 is an ideal intercept.

Regardless of the nation, most aircraft are formed into Squadrons of 10-12 aircraft and then grouped into a larger Wing of 2-3 Squadrons. This tends to be a constant despite differences in naming. You will often find that bases operate with typically 24-36 aircraft as a result. This rule does not apply to those bases listed as Transports , Maritime Aircraft, Trainers and Storage etc.

Consider making some aircraft unavailable, again some websites cover availability which is useful.

In all air patrol circumstances and air intercept you should be allocating pairs. Strikes need normally to be made for every four aircraft. Reconnaissance and MPA are likely in singles although many Eastern based countries use pairs again, one to track one to prosecute.

28.8 Air Defense

It would be nice to always have information on available SAM sites and Radar sites. However understandably this is often not easy to find. However a number of sites do show available Orbats and some show locations or at least a description. Adding these are a major research burden but I would argue is worth it. You also tend to find that the piece of information that gave you the site even gives a number of the unit based there so well worth pursuing.

Set the Emcon state for SAM sites and Radars, consider making some, especially the mobile one's not auto detected.

28.9 Maps

Check the date and start time for the map, close any that are not in use. Normally in placing units you will have constantly been using zoom and moving around the main map so remake it to avoid distortion. Remake a map and call it tactical or strategic etc. You'll find this under the map preferences heading. Set preferences to include water depths and land elevations as appropriate. Examine the threat zones by allowing all, sometimes they'll be set (badly) by default. Set preferences to show Country Borders. Close off by use of nav zones countries the player cannot over fly. If the player is allowed to over fly a territory cover that in the intro.

28.10 Missions

Again although this is not an easy subject, at the least it should be touched on.

You can effectively combine these for a group. Say set up a series of ref points and set a group to patrol there as ASuW. Trouble is they'll then head there at speed in a dead straight line. You can of course edit that course by moving waypoints, and can edit the speeds at each point. Assuming there are Submarines as targets allocate at least some Submarine strike missions with several helicopters from each Task Force. Use the show all command to identify the specific units rather than use a generic sub strike mission. That makes the strike more aggressive. Specific targeted strikes work well against surface units also, they are likewise useful if you decide to overwhelm the player defenses but only take out one or two ships. Simply allocate overwhelming force in 4's against the named ships and that should ensure a heavy strike on them, but only them. Just make sure the player doesn't have to keep these alive for the victory conditions.

28.11 Victory Conditions

Set Victory Conditions but be prepared to change these and change them again. In all honesty I find some work and simply put others fail for no real reason. Victory conditions based on destroy aircraft on the ground or destroy submarines are unpredictable, so you need to build in some allowance for these. In effect often neither is counted by the computer even if you do destroy them. I find its worth a first "blind" play through and see what you sink/destroy. Use that to set targets that are either testing or easy depending how you want the scenario to be aimed. This is an important one to test yourself as it is often difficult to get just right. Test that the conditions can be met for each side, the retest to ensure they can fail.

For up-to-date victory conditions, please refer to the following URL:

http://mediawiki.advancedgaming.biz/index.php/H3ANW_VC

28.12 Conclusion

Finally, I hope to perhaps add to this and would welcome others adding to it as well. It is generally helpful to keep in mind that a scenario cannot be created quickly overnight. Realistically for a first scenario you are often looking for around 6 months from start to finish. Expect to do a lot of research, its easier in the long run. Keep any information you find. I generally keep a folder of links, maps and background for each scenario. Expect to be challenged on it along the lines of "does country X have that Radar type", and "do we know where they are based?" the answer to some of these may always be impossible to be certain on, but anticipate the question at least.

People will help and support you, but appreciate questions along the lines of "did the TPS-43 stay in service with country such and such", they will be less impressed by generic set up defenses. You also can't realistically expect others to do the research or in fact the background to your scenario for you.

Ideally do a lot of testing yourself. I tend to view others testing as a finite resource. If I submit a scenario for testing I will normally get back say the first 3 errors that were found. Now the problem is, if I send in a scenario with ships that have incorrect names, that's the feedback I'll get, most testers will only check to a certain point. Now had I made sure all the basics were covered they'd have examined the scenario in far more detail and spotted that awkward bug that I had missed. Expect more errors to be found at each and every test, its not that anyone wants to persecute you, its just that after a while you get to know where to look and a large scenario has a lot of potential for problems. Expect a lot of work to complete fully that one scenario and look to improve it over time. I would seriously consider not working on the next until that one is close to completion.

If I had to save one area until last I'd have to go with saving. Save at each and every stage. I often save before I make a single formation, then save again once it seems to work. Above all save before testing it as its all too easy to run in editor and click save half way through your game. I would typically use around 50-100 saves each and every scenario.

29.0 Defeating the Aegis System in Harpoon 3

Athena went among them holding her priceless aegis that knows neither age nor death. From it there waved a hundred tassels of pure gold, all deftly woven, and each one of them worth a hundred oxen. With this she darted furiously everywhere among the hosts of the Achaeans, urging them forward, and putting courage into the heart of each, so that he might fight and do battle without ceasing. Thus war became sweeter in their eyes even than returning home in their ships.
-Homer, The Iliad (Book 2)

So you want to know how to defeat Aegis system in *Harpoon 3™*?

First, a little background: Aegis is named after Zeus's shield from ancient Greek mythology. Forged by Hephaestus, it was an invulnerable shield with Medusa's head at its top (or in the middle according to some versions). Given the nature of the ships that have this incredible defensive system installed, the name is apt.

In the 1980's, the United States commissioned new series of ships fitted with a new micrometric wave radar called SPY-1B. Ticonderoga- (CG-47) and Arleigh Burke- (DDG-51) class ships are fitted with such radar to protect large forces against the moment's threat: Soviet Union and its long-range bombers equipped with dreaded anti-ship missiles such as AS-4 or AS-6.

The Aegis system can be fully automated or partly automated according to the environment. SPY-1 radar guides missiles (SM-1 or SM-2 and their different evolutions) towards their targets (missiles and aircraft) with a great accuracy. Like in Greek mythology, Aegis was conceived as an invulnerable defense system.

It can, however, be sometimes defeated in *Harpoon 3™*. Here I won't speak about an easy solution that would consist in having more attacking missiles than defending AEGIS-guided missiles. There's another solution which demands a little more effort.

Imagine a scenario with China opposing the US Navy. The US Navy has a carrier group and an amphibious squadron heading towards Chinese-occupied islands. China wants to prevent this and mounts an attack against this force. The US force is comprised of one carrier, three amphibious ships, and an escort of three Ticonderoga-class and three Arleigh Burke-class ships. These six escort ships may seem to be an impermeable screen, but it can be pierced.

The best solution for China is to have a multi-directional attack on the US group. To this purpose, you need to know the distance to the target, the speed of your aircraft (sometimes different types with different speeds, and determine a solution mathematically. Let's go back to our confrontation:

The Chinese will attack from five different bases:

NW: 706 miles (8 Su-30 + 8 H-6 Badger)
W: 507 miles (8 Su-30 + 8 H-6 Badger)
Hainan: 646 miles (8 Su-30 + 8 H-6 Badger)
Spratly North: 175miles (12 JH-7)

Spratly South: 190 miles (12 JH-7).

Let's see now the cruise speed of our aircraft: Su-30s and JH-7s both travel at 540 mph; that's nine miles per minute. The H-6 Badgers fly at 459mph, which is 7.65 miles per minute.

So, if you want half of the aircraft (due to formation's maximum number of aircrafts limited to four) striking at the same time (let's say 95 minutes after the scenario begins to allow all aircraft to take off), your custom ready times should be as follows:

Hainan: Su-30 at +24 and H-6 at +11
NW: Su-30 at +17 and H-6 at +3
W: Su-30 at +39 and H-6 at +29
Spratly North: JH-7 at +76
Spratly South: JH-7 at +74

Like this, all of your aircraft should arrive more or less at the same time, firing their missiles at the US Task Force. Most of the missiles should be downed by Aegis-guided missiles, but some will make their way to the intended targets to at least damage and possibly destroy something.

The thing to remember here is the superiority of East Bloc forces over West Bloc during the 1970's. Few people realize how close it really was back in the early 1980's and there are several books written on East/West military levels during the Cold War. In the early 1980's, before the fielding of the US Army's new systems (M-1 Abrams main battle tank, M-2 Bradley infantry fighting vehicle, Patriot missile launcher, AH-64 Apache attack helicopter, etc.), it was a fact that NATO probably would not be able to hold Western Europe without resorting to tactical nuclear weapons. However, by 1985, the situation had stabilized and was tilting in NATO's favor. But the year of decision was around 1982/3. It was during those years that, had the Warsaw Pact attacked, that it would have been a toss up. This is borne out in many fiction novels on the subject, including Sir John Hackett's book "Third World War: August 1985", where NATO forces were hard pressed to hold against a Pact attack. It was only the good timing of a B-52 strike that stopped Soviet armored spearheads just short of cutting West Germany in half. Fiction, yes, but written by a man who knew what he was talking about.

If anything, the flow of technology is slower in naval circles than anywhere else. Warships are complex instruments and all too often need a new platform to support the new technology. However, placing new technology onto new platforms is much more expensive than placing newer tech on older platforms. This is one of the reasons why DLGN-38 was cancelled and AEGIS sat in someone's backyard for 10 years while the weeds grew and the dust gathered.

In 1985, VLS was just a drawing on a paper napkin in a restaurant. In 1985, the Mk26 fired two missiles every 10 seconds and the missiles themselves required finning. Mk26 Mod 2 (64 missiles of varying types) fired 32 salvos at ten seconds a salvo. This means that both Mk26s on a Ticonderoga class CG will empty their magazines in a little over 5 minutes. SS-N-19 has a speed of Mach 2.5 (approx. 1650 kts) and a range of 300 nm. That means, if launched at max range, the Shipwreck will arrive over target in 10 minutes.

But that's not the REALLY bad news.

The REALLY bad news is that the Standard SM-2 missiles of the day only had a 40nm range (SM-2 ER Block 3B was developed for VLS). So, if you factor in that the computers on the Ticonderoga will adjust the launch time so that the first salvo tries for an intercept at that 40 nm max range that gives the Ticonderoga only an extra minute plus the time it takes the SS-N-19 to travel the 40 nm to the target.

All told, this means that the Ticonderoga has 146 seconds from the time the first salvo of missiles is fired until the Shipwreck is over (or rather in her superstructure). In that time, the Ticonderoga will have launched 28 missiles (14 salvos), just against one missile.

Mind that the ship's computers will probably attempt to allocate more targets than what we are talking about here. This works both ways because it allows more missiles to be engaged with the same Pk%, the down side being that the system cannot engage very many targets a second or third time.

This is where priority comes into effect. The AEGIS computer (UYK-7 IIRC) will attempt to determine which missiles should be engaged and which should not. It's not always about director dwell time.

We would like to remind everyone this is a hypothetical scenario where US systems are able to detect the incoming missiles in sufficient time to allow AEGIS to engage at maximum range a single SS-N-19 missile with a Mk26 magazine full of Standard SM-2 SAMs (no ASROC). Furthermore, we have gone on the assumption that the Ticonderoga is the only ship around and that there isn't any carrier to protect. Multiple ships and High Value Units complicate an already bleak engagement envelope. Finally, we were nice enough to allow for no mechanical failures, jamming, missile fall-back, and all those little gremlins that can ruin anyone's day.

What does this mean? That you have approximately 56 missiles launched (remember that there's two Mk26s per Ticonderoga) to fend off the hordes of SS-N-19s or AS-4s that would make up a typical Soviet SAG or Regimental Backfire attack. Twenty planes to a regiment and you can count on at least three regiments plus supporting elements in a dedicated strike.

The bottom line is that, if you have to start shooting, you'd better pray that you get lots of intercepts because you probably won't get a second chance. We never knew how lucky we were that we didn't have to face off against that kind of large scale attack.

Now that I've depressed everyone, just think of how it would turn out with the older systems like Talos and Terrier. Thank God for VLS and the Computer Revolution.

30.0 Credits

Advanced Gaming Systems

Game System:
Larry Bond and Chris Carlson

Manual/Guide Authors and Editors:
Mike Mykytyn - Contributor and Testing
Dale Hillier - Contributor
Jan Paul Köster - Contributor, Wiki Master, and Testing
Ralph Benton - Editor
Michael Eckenfels – Manual Editing and Organization

Development Teams for of 3.6 and 3.7:
Jesse Spears v3.6
Darrel Dearing v3.7
Tim Jacobs v3.7
Russell Sharp - Deployment and Testing
Jonathon Reimer - Database Editor
Don Gilman - Project Manager
Dale Hillier - Multiplayer Scenarios and Testing

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The Allegro Open Source Project (http://alleg.sourceforge.net) for providing a wonderful Game Library. The Windows version of Harpoon 3TM never would have been completed without it.

The makers of Zinc and WindRiver (http://www.windriver.com/zinc). Zinc was the framework for the original Harpoon II, and without their permission to continue using Zinc, Harpoon 3TM for Windows would never have been started.

** And all of those stubborn Harpoon Heads who would not give up on this product **

Matrix Team

Executive Producer
David Heath

Associate Producer
Erik Rutins

Boxart and Logo Art Design
Marc Schwanebeck

Manual Editing and Content
Michael Eckenfels

Manual Design and Layout
Marc Schwanebeck

Public Relations & Marketing
Joe Lieberman

Administration
Liz Stoltz

Customer Support Staff
Mike Vahan, Daniel Heath, Alex Fiedler
Erik Rutins, David Heath

Forum Administration
Paul Vebber, Marc Schwanebeck
Erik Rutins , David Heath

Web-Database Design & Development
Alex Fiedler

Network and System Administrator
Mike Vahan

Network & PC Support
Ron Duquesnel

Quality Assurance Lead
Erik Rutins

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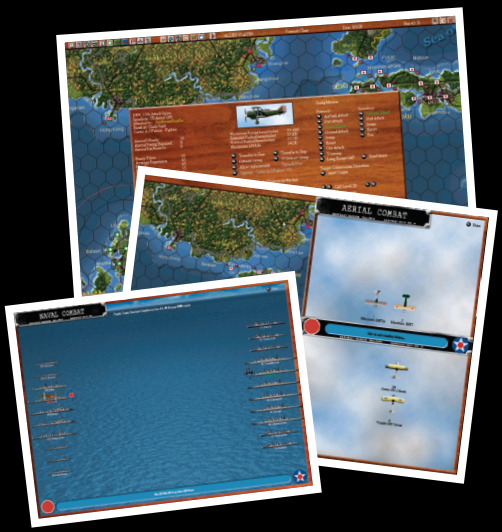
Ron Tedesco, Debra Pugh, Renee Schoenfelder, Marti Nagy, Thomas Heath, Yvonne Heath

Matrix NexGen
David Vebber, Megan Vebber, Rowan Lieberman, Andrew Heath, Nicholas Heath, Shane Heath, Austin Stoltz, Noah Stoltz, Cameron Eckenfels, Hannah Eckenfels and Erik Conkling.

Our Strength
We thank God for giving us the ability and strength to complete this project and follow our dream. We would also like to thank our families and friends for giving us their non-stop love and support during this project.

WORLD WAR II ARRIVES EARLY IN THE PACIFIC!



The Year is 1922. World War 1 has come and gone and the world has settled into an uneasy peace. The alliance between the United States and the other powers is weak as the powers try to maintain peace in Europe. Fearful of the growing strength of Japan, the United States created a series of plans in case of a pacific war with Japan. Their name: War Plan Orange. Consisting of three different scenarios, War Plan Orange was a comprehensive and real life "What if" scenario for the war in the pacific. In the world of Matrix Games a different story is going to unfold, and Japan, seeking natural resources to grow their power, will turn the full strength of their navy against the industrial giant of the United States.

Enter War Plan Orange: Dreadnoughts in the Pacific 1922-1930, where you will command the pacific fleet for either power in four different campaigns. The two major campaigns will take you from 1922 - 1926 and from 1926 - 1930. With incredible attention to detail and historical accuracy, War Plan Orange is the perfect modification to War in the Pacific for anyone who loves the time period between World War 1 and World War 2. The lack of airpower and inefficient fuels, as well as the natural resources required by both sides make War Plan Orange a completely different experience.

Additionally there are two PBEM scenarios included, making War Plan Orange powerful enough to stand on its own, as well as one of the largest mods and expansions to be released for any game. War in the Pacific fans will rejoice and newcomers will stand in awe of the tactical battles that will be waged in one of the greatest wars that never was (or at least, never was until more than a decade later).

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